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ABSTRACT

The main objectives of this study were: (1) to determine the degree to which SAT scores and high school grades were effective in predicting the freshman grades of disadvantaged/minority students; (2) to examine the validity of these same predictor variables for subgroups of minority freshmen formed on the basis of sex, ethnic background and "risk" admission status; and (3) to determine if the use of a common white regression equation for minority students either over or underpredicted their actual performance. The data was obtained from 200 minority students enrolled in the 1968 Educational Opportunities Program (EOP) and in the College of Letter and Science (CLS) at 2 University of California campuses. These data were cross validated with findings observed for entering 1969 EOP groups, and randomly selected control populations of over 600 CLS freshmen were added for purposes of comparison. The results showed that the high school average was the best overall predictor of college grades for both minority and white freshmen. SAT-V was a more consistent positive predictor for white than for minority students. Minority and white female SAT-V correlations were generally higher than those for males; and the predictor variables correlated poorer for EOP "risk" groups than for other groups. (Author/AF)

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THE PREDICTIVE VALIDITY OF THE SCHOLASTIC APTITUDE TEST FOR DISADVANTAGED COLLEGE STUDENTS ENROLLED IN A SPECIAL EDUCATION PROGRAM

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April, 1971

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SUMMARY

The main objectives of this study were: (1) to determine the degree to which Scholastic Aptitude Test (SAT) scores and high school grades are effective in predicting the freshman grades of disadvantaged/minority students: (2) to examine the validity of these same predictor variables for subgroups of minority freshmen formed on the basis of sex, ethnic background and "risk" admission status: (3) equation for white students to predict the grades of minority students.

Methods and Procedures

Over 200 freshmen minority students enrolled in the 1968 Educational Opportunities Program and in the College of Letters and Science on the University of California campuses at Los Angeles (UCLA) and Santa Barbara (UCSB), were selected for study. Data were collected, analyzed and presented on a wide range of demographic and academic variables. These data were then cross validated with findings observed for entering 1969 EOP groups. Randomly selected control populations of over 600 Letters and Science (L&S) freshmen were added for purposes of comparison. The EOP students were mostly Negro and Mexican-American, while L&S students were predominantly Caucasian. Six null hypotheses were tested at the 5 percent level of significance. Statistical techniques included: analyses of variance, chi-square, simple correlation, and multiple regression analyses. A computer program, based upon that of Wilson and Carry (1969), was developed to test the homogeneity of groups by comparing their regression equations.

Results of the Study

The results of this study showed that the high school average was the best overall predictor of college grades for both minority and white freshmen. The two year correlational patterns found for EOP students ranged from (-.198 to .380) and for L&S students (-.059 to .322). SAT-V (verbal) was a more consistent positive predictor for white than for minority students; the findings were less consistent for SAT-M (math) scores. Although mostly statistically significant, the Multiple Rs showed that only slight increases occurred through combining variables to predict freshman grades. The criterion variance (R^2) accounted for in this study remained below 25 percent for the major populations investigated. Minority and white female SAT-V correlations were generally higher than those of males. The predictor variables correlated poorer for EOP "risk" groups than for other groups. High school average showed promise as a fair indicator of college grades for Mexican-American students.

Systematic differences were observed in the correlation patterns of the sister institutions. Inconsistencies in the data between campuses suggested there were different institutional approaches to grading, counseling and in courses selected by students. Further inconsistencies were discovered when many of the 1968 regression equations could not be cross validated with their comparable 1969 group regression equations.

An analysis of the intercorrelations of quarterly grades showed the criterion, freshman grade point average, to be less reliable for minority students than for whites, and that using a common white regression equation for minority students neither over nor under-predicted their actual performance. One exception was that for EOP special action risk students, consistent under predictions were discovered.

Recommendations

Among others, recommendations included further experimentation with nonacademic predictor variables, the use of the high school grade point differential in selection and counseling procedures, a large-scale study of the reliability of college grades as a criterion measure, and further investigation into the possibility of a test bias for "risk" students.

CHAPTER I

Introduction

NATURE AND SCOPE OF THE STUDY

The door to educational opportunity in American higher education is beginning to open. Across the land, institutions of higher learning are searching for high potential disadvantaged students who desire to attend college, but are unable to do so because of the traditional financial, cultural, and geographical barriers to education. Certainly these students represent an untapped resource pool of talent, in that once these barriers are removed, we can anticipate that many will enroll and, hopefully, complete their college education.

In response to the growing need for recruitment and enrollment of additional numbers of disadvantaged students, several institutions have now established special education programs. A prime example is the Educational Opportunities Program (EOP) of the University of California. While not a unique program, EOP is reportedly the largest of its kind in existence. Since 1964, when the first EOP students were admitted to the Los Angeles campus, the EOP has expanded to all nine campuses of the University system. During the academic year 1968-69 over 2000 students participated.

The EOP attempts to remove educational barriers by providing special student assistance; specifically, financial aid, on-campus housing, academic counseling, and tutoring. Unlike other more experimental campus programs, EOP students, upon enrollment, are expected to participate in regular academic courses and pursue normal course loads.

The EOP focuses particularly on recruiting those disadvantaged students from low-income and/or minority group backgrounds who can most benefit from a college education. Some illustrative objectives of several campus EOP programs, as presented in a Report to the Regents of the University of California (1968), are:

> BERKELEY . . . designed to increase significantly, and as soon as possible, the number of minority group and low-income persons on the campus . . . to reach more Black, Mexican-American, and American Indian persons and, secondarily to reach other persons be they Caucasian, Oriental, Filipino, or who are of low-income backgrounds.

DAVIS . . . to enable and to encourage disadvantaged low-income and minority group students to enter the University of California and complete a course of study there.

RIVERSIDE . . . to identify potential University students . . . to make certain that the University of California makes every effort to increase the number of minority and other disadvantaged students who matriculate at our institution and who complete their studies successfully.

SAN DIEGO . . . to make as many opportunities available as possible and to motivate students in a direction that would be for the betterment of society . . . to help the disadvantaged person to achieve his goals that are centered around necessary academic achievements.

Unfortunately, not all deserving disadvantaged students can be accommodated through such forward looking programs as the EOP. The lack of space and pressing budgetary restrictions increasingly require that the process of selection to any special education program be carefully conducted. It is common knowledge, for example, that at the University of California both the EOP director and admissions officer on each campus seek candidates with maximum likelihood for academic success.

To assist in the selection process the University of California requires not only the record of each student's past academic achievement, but the scores received on the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB). The SAT is currently the most popular of the aptitude tests used to predict the academic success of college students. The SAT requirement at the University of California reflects the nationwide reliance on aptitude tests in the admissions process. It is notable that between May, 1967 and March, 1968, the CEEB administered the SAT to 887,465 high school seniors (CEEB, 1969).

This greater reliance on tests has recently caused some questions to be raised concerning aptitude tests such as the SAT. One question that often arises is: Just how valid are SAT scores in predicting academic success for disadvantaged students? This question is pertinent since articles have appeared in the literature indicating unexpectedly admirable performances of disadvantaged students despite low probabilities for success as evidenced by poor SAT scores. Among those authors reporting instances of student achievement surpassing expected performances as predicted by the SAT are: Sabine (1968) in Project Detroit at Michigan State University, Sommerville (1967) Berkeley, and Morgan (1966) at Kutztown State College (Pa.).

Moreover, many of the students in the above reported studies were admitted to special education programs with a risk classification denoting "not normally admissible."[1] In spite of this fact, during

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[1] The University of California allows 4 percent of each freshman class to enter as "special action" cases.

1967-68, EOP students at the University of California performed at about the same academic level as regular students who were originally eligible for admission (see Report to the Regents, 1968).

Findings such as these have led this investigator to an examination of the validity of SAT scores for disadvantaged students and, even more important, to an examination of the usefulness of a traditional "yardstick" in predicting the academic performance of these students.

Disadvantaged students, as a group, score lower on the SAT than do nondisadvantaged students. Kendrick (1967) cites evidence that if all Negro twelfth graders took the SAT-verbal test, 10 to 15 percent at most would score as high as 400, and only 1 or 2 percent would score as high as 500, the mean score for all college students. Coleman (1966) in the landmark report, Equality of Educational Opportunity, found Negro students scoring significantly lower than their white counterparts on verbal items from the School and College Ability Test (SCAT). This is noteworthy in that the SCAT at the twelfth grade level is in its verbal parts very close to the SAT. Hills (1965) showed that for 1,097 Negroes who entered the University of Georgia system (a system requiring the SAT of all students entering its member institutions) the mean SAT-verbal score was 266. Among those students, only 1 percent scored as high as 456 or above and only 3 percent scored as high as 400.

A point to be made from this data is that disadvantaged Negro students are not likely to be admitted to our more selective integrated institutions due to poor SAT scores. Kendrick has further noted that the more selective integrated institutions in the North are continually competing among themselves in recruiting only those Negro students who score higher on the SAT. After citing evidence, Kendrick also concludes that "of these few best Negro students many, perhaps most, are going to attend predominantly Negro colleges anyway."

Another point of interest is that by merely establishing high cutoff SAT scores for admission, an institution can automatically discriminate against Negroes and other minority groups who, as noted, score significantly lower than their white counterparts. Currently, the University of California admits students with a combined SAT verbal and mathematics score of 1100 regardless of certain academic deficiencies. One can speculate as to the low number of disadvantaged students who would qualify for admission on the basis of this achievement alone.

The major objectives of this study are directed towards an examination of certain academic criteria now required of all prospective students applying for admission to any of the nine campuses of the University of California. In particular, this investigation focuses upon the predictive validity of the Scholastic Aptitude Test and high school average of minority group students entering the University of California through the Educational Opportunities Program.

More specifically, there are three main objectives of this study: (1) to determine the degree to which Scholastic Aptitude Test scores and high school grades are effective in predicting the freshman grades of disadvantaged/minority students; (2) to examine the validity of these same predictor variables for subgroups of minority freshmen formed on the basis of sex, ethnic background, and "risk" admissions status; and (3) to discover whether or not there is a bias in using a common regression equation for largely white middle-class students to predict grades of minority students.

To accomplish these objectives, two major predictors will be investigated. They are (1) the Verbal score of the Scholastic Aptitude Test (SAT-V) of the College Entrance Examination Board, and (2) the Mathematics score of the Scholastic Aptitude Test (SAT-M) of the College Entrance Examination Board. A third predictor, high school average (HSGPA) is included, since admissions officers generally use SAT scores in combination with some record of high school performance in predicting academic success (Bloom and Peters, 1961). The criterion to be predicted will be freshman grade point average (FGPA) as measured at the culmination of three quarters of University attendance.

It is not an intent of this investigation to conduct an examination of SAT "test bias" as this term is used in its usual sense. This is not feasible since EOP students receive different treatment (e.g., tutoring and financial aid) which clearly contrast them to the majority of students in the regular population. Furthermore, the special treatment received by EOP students could affect the findings.[2] However, through the present approach a bias can be discovered if the SAT does not possess the same validity for disadvantaged EOP students as for regular students, but is interpreted as if it does. For instance, in this study we will be attempting to discover if a specific SAT verbal score predicts approximately the same freshman grade point average for a typical EOP student as it does for a regular college student. Similar questions could also be asked about the aggregate of predictor variables, such as a combination of SAT verbal and SAT mathematics scores. In sum, if significant differences are found in the predictability of the scores using different groups, and the scores are interpreted in the same manner, then one might label this interpretation as being biased.

Moreover, this study is not designed to discover reasons for possible differences in actual versus predicted academic performances of disadvantaged students. It is felt in some circles, for example, that disadvantaged students demonstrate special attitudes, motivations, needs and expectations which could affect academic performance.

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[2] For a detailed discussion of interpretation of the findings, see Chapter IV.

Rather, what is intended is an empirical investigation of the predictive validity of a particular aptitude test for students enrolled in this type of program. Hopefully, these findings will suggest future avenues of approach and illustrate the need for related types of studies dealing with other factors such as those mentioned.

Importance

Fairminded individuals have long realized the moral and ethical bases supporting the justification for enrolling larger numbers of qualified disadvantaged students in the more selective institutions of higher learning. However, as the knowledge of special programs designed to recruit the disadvantaged spreads throughout the ghettos and barrios of the big cities, we can expect larger numbers to be applying for admission. The numbers, in fact, are expected to exceed the space available. Equally as important are the budgetary restrictions which are imposed upon many institutions.

At the University of California, the admission officers, EOP directors and high school counselors all share the burden of identifying and recruiting students for EOP. They realize that the selection of the wrong applicant can be a serious mistake. An unsatisfactory performance is damaging to the student, the program, and the institution, among others. Certainly it involves a waste of time, money, and professional energies.

Moreover, the enrollment of a disadvantaged student who is a calculated risk has special meaning. Theoretically, since enrollment limitations are imposed upon all University of California campuses, an EOP student could displace a more qualified applicant. As a result, some applicants, not in EOP, could feel that it is they who are being discriminated against rather then those from ethnic minority groups.

With all this in mind, it seems imperative for those concerned with the selection of EOP students to have criteria proven to be efficient in determining the academic fitness of each applicant. It is in this context that this investigation bears its greatest significance.

Definitions

In order to facilitate communication between this researcher and the reader, several definitions are presented. In that the terminology used in this research study may differ somewhat from other research reports it is advisable that the reader become thoroughly familiar with these definitions.

Disadvantaged Student is defined herein as one who, as being from a minority ethnic group or a low-income family, or both, has the potential to benefit from a higher education, but would not normally enroll because of his cultural/economic differences from the majority of students.

Regular Student is defined herein as one who is not disadvantaged, as defined above, and who is in the regular student population.

Subgroup is defined herein as a special group under focus that is part of a larger group.

Predictive Validity is a characteristic within a test or measuring instrument which accounts for the degree to which the measure correlates with a criterion of performance or success. A high predictive validity usually denotes a significant positive or negative correlation between the predictor and the criterion, and, conversely, a low predictive validity usually denotes insignificant correlations (see Thorndike and Hagen, 1955).

Admission Status is defined herein as a classification assigned by the University of California as to a student's eligibility for admission. Students are classified as either "regular admit," meaning they have met all requirements for admission, or as "special action admit," meaning the student has not met all requirements for admission but has been able to qualify under a special university admissions rule. To be eligible for admission to any University of California campus a student normally must (1) possess at least a B high school average, (2) take the proper prerequisite high school pattern and (3) take the Scholastic Aptitude Test and three achievement tests in (a) English composition, (b) social science or a foreign language, and (c) mathematics or science.[3]

Ethnicity is defined herein as the student's racial background. EOP students are predominantly from Negro, Mexican-American and Oriental backgrounds. Smaller numbers come from American Indian and Caucasian backgrounds.

Populations to be Used

This investigation was conducted on the University of California campuses of Los Angeles (UCLA) and Santa Barbara (UCSB). These institutions are among the largest of the nine campuses of the University of California system and are located in relatively close proximity to one another. They were selected as sites for this investigation primarily for two reasons: (1) both institutions have Educational Opportunity Programs of similar size and organization, and (2) both institutions are assumed to possess a similar level of educational quality.

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[3] Applicants whose scholarship average in the required high school subjects is 3.00 to 3.09 inclusive must achieve a minimum combined total score of 2500 on the SAT and the three achievement tests. An applicant who is noneligible according to admission requirements may also be admitted by examination alone. To qualify, the total score on the SAT must be at least 1100; the scores on the three achievement tests must total at least 1650, and the score on each must be at least 500.

From these campuses two major populations were defined and selected for study. These populations are classified as either disadvantaged or nondisadvantaged, and are described as follows:

Major Populations

Educational Opportunities Program EOP

This disadvantaged population includes all first time freshmen (nontransfer students) enrolled in both the Educational Opportunities Program and in the College of Letters and Science at UCLA and UCSB during Fall Quarter, 1968, and 1969. Of these two groups only those students with complete SAT scores and high school transcripts were included. Most of these students are from minority ethnic groups.

Letters and Science L&S

This nondisadvantaged population includes all first-time freshmen enrolled in the College of Letters and Science at UCLA and UCSB during the Fall Quarter, 1968, and 1969. Since this population was extremely large, a random sample of one in ten was selected from each campus.

It should be noted here that although the original analyses were intended to include only Fall Quarter 1968 entrants, the later addition of the Fall Quarter 1969 groups provided excellent cross validation material for this study.

Hypotheses

A number of hypotheses pertain to the objectives of this investigation. As stated, according to the null hypothesis, they are as follows:

1. There is no significant correlation between each of the independent predictor variables, SAT-V, SAT-M, HSGPA and the criterion, FGPA for EOP, and L&S.

2. There is no increased significant multiple correlation when the independent variables are combined to predict the criterion for EOP, and L&S.

3. There are no significant multiple correlations found for EOP, and L&S when sex is held constant.

The following hypotheses deal specifically with the EOP groups. These hypotheses are limited to the EOP populations due to an expected finding of insufficient eligible numbers in the L&S populations.

4. There are no significant multiple correlations found for EOP when special action admissions status and sex are held constant.

5. There are no significant multiple correlations found for EOP when ethnicity, sex and special action admissions status are held constant.

6. There are no significant differences in the multiple regression equations found between the respective L&S major populations and the EOP population and selected EOP subgroups within each campus.

NOTE: For an explanation of regression equations and the technique used for comparison of regression equations, the reader is referred to Appendix B.

CHAPTER II

REVIEW OF THE RELEVANT LITERATURE

In order to provide the context of the investigation under consideration what follows are summaries of findings from selected studies related to the topic. Since this section is fairly extensive these summaries are, in turn, synthesized into a general summary at the conclusion of this chapter.

The Prediction of FGPA for Regular College Students Using the SAT of the College Entrance Examination Board

The selected validity coefficients reported for predicting success for college students using the SAT appear to be modest. Fourteen SAT studies reviewed in an ETS bulletin covering the period from August, 1959 to May, 1961 were discussed in Buros (1965; p. 707). The validity coefficients reported for predicted success of male liberal arts students as measured by freshman average grades range from .16 to .61 with a median of .35 for the verbal scores, and from .15 to .53 with a median of .33 for the mathematics scores. Corresponding selected validity coefficients for female subjects cover approximately the same range with the median values of .36 and .26 for verbal and mathematics scores, respectively. In general, the verbal scale has been found to predict freshman grades better than the mathematical scale in liberal arts colleges, while the mathematical scale has been found more valid for engineering colleges (Buros, p. 706).

A latter review by Howell (1964) also showed that the SAT-verbal score is a slightly better predictor of first year college grades in general than is the SAT mathematical score. He found modest mean validity coefficients of .38 for SAT-V and .36 for SAT-M for 271 groups of students in four-year and two-year colleges. In addition, Howell also found higher mean validity coefficients for women than for men. Cronbach (1960) and Shimberg (1946) also found the correlations for SAT-V scores with grade point averages higher than those for SAT-M among college students.

Some investigators have stated the importance in determining validity coefficients for each sex. For example, Durflinger (1943) has revealed from his comprehensive summary of research on college success, that regression equations for men and women are not interchangeable and should be separately determined.

Among the recent studies conducted using the SAT to predict college success for women was a study by Spaulding (1959). Spaulding used three aptitude tests, the SAT, the Ohio State Psychological Test, the College Qualifying Test (CQT) and high school standing as predictor variables, and grade point average as the criterion for 208 first-year women in a junior college. She found the following correlation coefficients with predicted success: SAT-V .47, SAT-M .29, SAT Total .41, Ohio State .44, CQT Total .36, and high school standing .36. Butt, Vick, and Hornaday (1962) and Mann (1961) have reported SAT correlation coefficients for women similar to those of Spaulding.

Several studies of validity using the SAT in conjunction with disadvantaged populations are available. Hills, Klock, and Lewis (1963) reported correlations of SAT verbal and mathematics scores with first year average grades for freshmen entering both the Negro and white colleges in the Georgia State University system. The lowest correlations for both male and female students were found in the white colleges rather than in Negro colleges. The validity of the test in Negro colleges is made more striking by the fact that the standard deviation of the scores in the Negro colleges was approximately half that in the white colleges. Normally, one might expect to find lower correlations with less variability in scores. However, one explanation might be that in this study scores in the Negro colleges piled up at the lower end, and no correction for restriction in range was applied.

Biaggio and Stanley (1964) conducted an analysis of variance on data collected by Hills (1964), over the academic years 1959 through 1962, in the Georgia State University system. They found that when a correlation for restriction in range was applied, the correlations of test scores with freshman grades were significantly higher for the Negroes than for non-Negroes. When the restriction in range was not considered, they found that correlations were significantly higher for non-Negro females than for Negro females; there were no significant differences among Negro and non-Negro males. Thus, Biaggio and Stanley demonstrated that the application of a restriction in range formula was necessary in counteracting the effects of a piling up of scores at the lower end of the range.

Stanley, Biaggio, and Porter (1966) extended the Biaggio-Stanley (1964) study to cover six years, 1959 to 1964. When correlations with grade-point average were corrected for restriction in range and subjected to four analyses of variance (SAT-V for men and women; SAT-M for men and women), they were found to be significantly higher in the Negro colleges. When the original correlations were used in the analysis of variance technique no significant differences between non-Negro males were found, but the correlations for non-Negro females were significantly higher than for Negro females. They concluded that SAT-type test scores are valid for the prediction of the college grades of Negroes competing with Negroes and taught primarily by Negroes.

Roberts (1962) found that in a sample of 129 Fisk freshmen, SAT-V scores had a correlation of .63 with freshman grade point average, and SAT-M scores, a correlation of .68. In 1964, Roberts reported the correlation coefficients for 1962 freshmen in eight Negro colleges with sample sizes ranging from 40 to 203. The median correlation with freshman grade-point average was .50 for SAT-V and .47 for SAT-M These correlations are similar to those observed in other populations.

McKelpin (1965) studied the prediction of freshman grades from SAT scores and high school averages in the predominantly Negro liberal arts college, North Carolina College at Durham. He found validities that were as high as those commonly reported in the literature.

Stanley (1967) found that end of year freshman grades of the women in thirteen predominantly non-Negro co-educational state colleges in Georgia were predicted much better by SAT verbal scores over a six-year period than were grades of the men in those colleges.

Stanley and Porter (1967) found SAT type test scores about as valid for Negroes competing with Negroes and taught chiefly by Negroes as they were for whites. They also concluded that this prediction may be approximately equal for the races within integrated colleges.

The validity of the SAT for predicting academic success of Negro students in integrated colleges was investigated by Clark and Plotkin (1963). They studied a group of students who had applied for aid from the National Scholarship Service and Fund for Negro Students in order to enter interracial colleges in the years 1952 and 1956. Clark and Plotkin suggest that perhaps the SAT is not a valid predictor of academic success for Negroes in integrated colleges. They found that while the SAT did discriminate between those who completed college with a B plus or higher average and those who completed college with a C plus or lower average, it did not discriminate between those who completed college and those who did not graduate. Clark and Plotkin (1963, p. 21) also stated that the academic performance of the students they studied was far beyond the level that would be indicated by College Board Scores.

The Clark and Plotkin study led to a large scale investigation by the Educational Testing Service, the designer of the SAT. The investigation conducted by Cleary (1966) had as its purpose whether Negroes' college performance is greatly underestimated by SAT scores when the Negroes are entering an integrated institution. In this study, SAT scores were compared to freshman grades in three integrated colleges, two in the east and one in the southwest. In the two eastern schools, Cleary found no significant differences in the predictive validity of the SAT for Negro and white students. In the one college in the southwest, significant differences were found in predictive validity; Negro students were slightly overpredicted. Thus, where the SAT was found to be biased, it was reported to be biased in favor of the Negro students. An earlier investigation Cleary and Hilton (1966) concluded that the items in the Preliminary Scholastic Aptitude Test (PSAT) were not biased and that, if the PSAT is discriminatory, the discrimination is not attributable to particular sets of items but to the test as a whole.

In sum, the previous studies do tend to support the conclusion that the validity of the SAT as a predictor of college grades for Negroes in Negro colleges appears to be at least as good as the predictive validity for white students in predominantly white colleges. Some confusion, however, exists regarding the predictive validity of the SAT for disadvantaged students in integrated colleges as indicated by the different conclusions of Clark and Plotkin (1963) and Cleary (1966).

Unfortunately, all of the reported studies thus far suffer from at least three observable shortcomings: (1) The populations are mainly Negro; other minority ethnic groups are not considered. (2) The bulk of the studies deal with southern Negro college students, with the exception of Cleary's which included two eastern state-supported institutions and one state supported institution in the southwest. (3) Little background information is provided on the student population by the researchers. For instance, typically one does not know how "disadvantaged" is defined or if the disadvantaged students participated in any special programs.

Unlike other published studies the investigation herein will consider different minority ethnic groups. In addition, it was conducted on two campuses of a prestigious, integrated state-supported western institution with a rapidly increasing minority group enrollment. The term "disadvantaged" is clearly explained so that the reader should find no ambiguity in its definition. Finally, this investigation appears to be the first, to the best of this researcher's knowledge, to examine empirically the predictive validity of established admissions criteria for disadvantaged students enrolled in a special education program.

The Prediction of FGPA Using High School Average

The most comprehensive investigation of the high school grade point average as a predictor of college success was conducted by Guisti (1964). Guisti compiled a table in which he condensed the findings of six previous surveys of the literature pertaining to high school averages (p. 207). He concluded that "the most significant conclusions resulting from the exploration of the field of predictions studies is the unquestionable superiority and stability of high school averages as a single source of data for predicting college success" (p. 207).

Among additional studies corroborating the findings of those reviewed by Guisti are those by Carlson and Milstein (1958), Douglass (1931), Frederiksen and Schrader (1952), and Scannel (1960).

The Prediction of FGPA Using Multiple Predictors

Prior to this section we were concerned with how well separate predictors (i.e., SAT scores or high school averages) estimated the academic success of college students. Now we will be concerned with what results when the predictors are no longer used separately but rather in combination to estimate academic success.

Howell (1965) in his report to the College Entrance Examination Board noted, from his sample of 231 groups in four-year and two-year colleges exclusive of engineering groups, that the mean multiple correlation coefficient of high school average and SAT scores with freshman grade point average jumped to .60 from .28, .33, and .43 after combining SAT-M, SAT-V and high school grades. This, as shown, was a significant increase over the correlation coefficients derived when the predictors were used separately to estimate academic success.

Fishman and Pasanella's (1960) survey of selected studies pertaining to college admission revealed that for 147 studies predicting FGPA from high school records and College Board scores, the range of multiple correlation was from .34 to .82 with a median of .61. Their survey also revealed that in twenty-one studies which used an aptitude test (such as the SAT) plus the high school average, the multiple correlation was increased from .00 to .23 beyond the zero-order correlations based upon high school average alone. In general, their survey indicated that the use of one or more predictor variables in combination with the high school average improved the forecast of FGPA in 181 studies by .00 to .38 with an average gain of .11.

The College Entrance Examination Board (1968) also has noted that research studies have demonstrated that a combination of SAT scores and high school record is a better predictor of the ability to do college level work than is either one alone (p. 19).

Among the studies conducted using multiple variables to predict college grades were those by Hills, Masters and Emory (1961), Jones and Micheal (1963) and Micheal _et al_. (1962).

Hills, Masters and Emory found multiple correlations between freshman grades and SAT-M, SAT-V, and high school average similar to those reported by Fishman and Pasanella (1960). Jones and Micheal (1963) and Micheal _et al_. (1962) found increased multiple correlations by combining the same variables for both men and women students.

Finally, Olsen (1957), and Roberts (1964) reported that when SAT scores have been used in combination with high school record, similar multiple correlations have been found in both Negro and white colleges.

Summary of Relevant Literature

This section summarized the general trends in prediction research during the past forty years. Particular emphasis was placed upon SAT scores and high school averages as they predict college success for regular and disadvantaged student populations.

The following are some of the main findings:

1. The SAT is only a fair predictor of college success when used alone. Modest coefficients of correlation have been reported when the SAT is used to predict FGPA.

2. Coefficients of correlation for female students appear to be slightly higher than those for male students.

3. For disadvantaged college students enrolled in Negro colleges the validity of the SAT as a predictor of college grades appears to be at least as good as the predictive validity for white students in predominantly white colleges.

4. For disadvantaged college students enrolled in integrated colleges there is some controversy as to how well the SAT predicts college grades.

5. The high school grade point average appears to be a better predictor of college grades than SAT scores.

6. A combination of SAT scores and high school average improves the validity coefficients for both regular and disadvantaged students.

7. When a combination of SAT scores and high school averages are used to predict college grades, the high school average still contributes the most to predictability.

A reading of the literature to date indicates that the investigation herein appears to be the first to examine established admissions criteria empirically for different ethnic minority groups enrolled in large integrated state supported institutions, and to provide extensive descriptive data for these same groups. Moreover, this appears to be the first published study to clearly define the term "disadvantaged" as used within an empirical investigation and to consider the validity of the SAT for disadvantaged students enrolled in a special education program.

CHAPTER III

COLLECTION OF THE DATA AND DESCRIPTION OF THE CAMPUSES AND SAMPLES

The University of California, Los Angeles (UCLA) first opened its doors to 250 students in 1919. Situated in the Westwood Hills in Western Los Angeles, UCLA was originally known as the "Southern Branch" of the prestigious University of California.[4] The Fall 1968 enrollment at UCLA was 28,997. Of this figure 18,695 were undergraduates. The College of Letters and Science enrolled 15,078 and was by far the largest of the undergraduate colleges. The Educational Opportunities Program at UCLA reported a Fall 1968 enrollment of 737 students.

The University of California at Santa Barbara (UCSB) was established in 1944. It has since undergone extensive growth from an undergraduate liberal arts college to a general university campus. UCSB is located on the Pacific seashore, two miles from the town of Goleta and ten miles from the city of Santa Barbara. Enrollment at UCSB, as of Fall 1968, was 12,619. There were 10,858 undergraduate students, of which 10,308 were enrolled in the College of Letters and Schence. The Educational Opportunities Program reported a Fall 1968 enrollment of 231 students.

On both campuses a roster of Fall 1968 and 1969 entering, first time (nontransfer) EOP students was obtained from the respective EOP offices. These rosters were later modified by eliminating the names of those EOP students who were not enrolled in the Colleges of Letters and Science.

At UCLA, a computer program was developed and utilized to retrieve the L&S sample from the campus student profile tapes.[5] From these tapes the computer program selected data for all entering first time (nontransfer) students enrolled in Letters and Science, Fall 1968 and 1969. From this list every tenth name was selected for inclusion in the L&S sample. In addition, the roster of UCLA EOP students was compared to the entire Letters and Science list, and those EOP students not enrolled in Letters and Science were dropped from the study.

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[4] In Fall 1968 the University of California (UC) enrolled around 100,000 students on nine separate campuses.

[5] The Fall 1968 and 1969 student profile tapes contain the names and certain registration data on all students registering at UCLA during that quarter.

At UCSB, the L&S sample was selected in a different manner. The names of the students were chosen by picking every tenth student registration card from a student card file located in the Registrar's Office. These cards were color coded according to year in college, so that selection of all entering freshmen was a straightforward task. However, in the few cases when a card denoted that the student had not enrolled in Letters and Science, it was by-passed and the card immediately following the by-passed one was considered. The UCSB Admissions Office cooperated by providing information as to which of the students on the EOP roster had not enrolled in Letters and Science. Those noneligible EOP students were dropped from the study.

Once the student population and samples were selected, the next task was to gather a complete set of data on each variable of concern for all students.[6] These variables were as follows: sex, ethnic background, admission status, high school average, freshman grade point average, units attempted, SAT-Verbal scores, and SAT-Math scores. Each of these variables will be discussed in this section. In a related study, Cherdack (1970), data reported herein were also gathered on age, income status, residence status, major field and area field grade point average using only the Fall 1968 groups.

Chi-square and analyses of variance techniques were applied to determine significant differences between the groups and subgroups on selected variables. In each case the .05 level ($p < .05$) was considered the minimum level of statistical significance. The reader will find a description of these techniques in Appendix D.

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[6] On the UCLA campus, a computer program was developed to transmit the data from the tapes directly to IBM computer cards. Data for all variables except freshman grade point averages, units attempted and ethnic background were extracted from the student profile tapes. Information on ethnic background for EOP students was provided both by the EOP office and the EOP counselors in Letters and Science. The Registrar provided a transcript, Spring Quarter 1968 and 1969, for each student in the study. From these transcripts data on freshman grade point averages were recorded on worksheets and later keypunched on IBM computer cards for analyses.

On the UCSB campus, a computer program was not available for assistance in gathering data. Instead, the Admissions Office provided the necessary descriptive data on each student. The Registrar made transcripts available for determination of freshman grade point averages and units attempted. The EOP Office provided ethnic background information on the EOP students. All data were also recorded on worksheets and later keypunched for computer analyses.

Table 1 shows the distribution of sex for EOP and L&S students. Here it is shown that for the 1968 groups there were 113 UCLA EOP and 216 L&S students included in this study. The 1968 samples at UCSB included 110 EOP and 200 L&S students. For the 1969 groups, the numbers of EOP students dropped slightly to 102 for UCLA and 107 for UCSB. There was however, an increase in the numbers of L&S students due to larger enrollment in both institutions; 280 at UCLA and 251 at UCSB.

TABLE 1

Distribution of Sex for EOP and L&S Students

Sex	EOP		L&S		Chi-square
	(N)	%	(N)	%	
UCLA[a]-1968					
Male	(46)	41	(105)	49	1.56†
Female	(67)	59	(111)	51	
Total	(113)	100	(216)	100	
UCSB[a]-1968					
Male	(57)	51	(99)	50	0.07†
Female	(53)	49	(101)	50	
Total	(110)	100	(200)	100	
(Chi-square)	(2.33)†		(0.06)†		
UCLA[b]-1969					
Male	(42)	41	(152)	51	2.34†
Female	(60)	59	(128)	49	
Total	(102)	100	(280)	100	
UCSB[b]-1969					
Male	(45)	42	(127)	51	2.56†
Female	(62)	58	(124)	49	
Total	(107)	100	(251)	100	
(Chi-square)	(0.01)†		(0.09)†		

[a] 1968 group data
[b] 1969 group data
†p = Not significant

Chi-squares for sex were analysed comparing between campus distributions (i.e. UCLA EOP vs UCSB EOP) and within campuses (i.e. UCLA EOP vs UCLA L&S). Sex data for each year were analyzed separately.

As Table 1 reveals, there was a fairly equal distribution between the sexes. None of the percentages shown appear to deviate extensively from a 50-50 percentage, and correspondingly, none of the chi-squares computed were significant. In sum, neither campus has shown a preference for either sex as determined by their enrollment patterns.

There are, however, different campus patterns in EOP recruitment, as noted in Table 2. Both campuses do enroll more Negro and Mexican-American students than the other ethnic groups shown. However, at UCLA during 1968 only 38 percent of the students were Negro. At UCSB this percentage was 57 percent. The proportions of Mexican-American students enrolled were more similar (28 percent at UCLA vs 32 percent at UCSB). The Oriental groups again reflect major differences between UCLA and UCSB (18 percent vs 6 percent). Moreover, during 1968, UCLA recruited a larger percentage of Caucasian students (15 percent vs 2 percent). The American Indian enrollment was low on both campusus.

TABLE 2

Distribution of Ethnic Background for EOP Students

Ethnic Background	UCLA		UCSB		Chi-square
	(N)	%	(N)	%	
1968					
Negro	(43)	38	(63)	57	24.35**
Mexican-American	(32)	28	(36)	32	
Oriental	(20)	18	(6)	6	
Caucasian	(17)	15	(2)	2	
American Indian	(1)	1	(3)	3	
Total	(113)	100	(110)	100	
1969					
Negro	(31)	30	(42)	39	21.40**
Mexican-American	(43)	42	(56)	52	
Oriental	(15)	15	(1)	1	
Caucasian	(8)	8	(4)	4	
American Indian	(5)	5	(4)	4	
Total	(102)	100	(107)	100	
(Chi-square)	(29.01)**		(32.15)**		

$^{**}p < .01$

There were some significant changes in ethnic enrollment for 1969 which can also be readily seen in Table 2. For instance, during 1969, UCLA recruited a smaller proportion of Negro students and larger numbers of Mexican-Americans (30 and 42 percent respectively). Likewise, at UCSB Negro enrollment dropped to 39 percent and Mexican-American enrollment increased to 52 percent. The Oriental enrollment pattern still shows UCLA recruiting a larger proportion of Oriental students (15 percent at UCLA vs 1 percent at UCSB). Caucasian enrollment remained low on both campuses, with UCLA enrolling about half as many Caucasians as in 1968. On the other hand, American Indian enrollment increased on both campuses. All of the chi-squares computed were significant.

The campus differences in distribution of ethnic enrollment could be interpreted in various ways. A point to keep in mind, however, is that while one EOP goal may be to recruit representative proportions of students from the different ethnic backgrounds found in the community, this may not always be possible. Each ethnic group has now organized itself in an effort to bring additional numbers of their kind to the campus community. The EOP director and Admissions Officer both face pressures from these and other interested organizations and groups. It should be interesting to follow the trends in enrollment and to observe further developments.

Table 3 is a special table developed for making campus comparisons of admissions status. Students classified as "regular admits" were those qualified for admission to either campus under existing admission standards; almost all of the L&S students on both campuses during 1968 and 1969 fall into this category. In addition, the University of California enforces a rule by which up to 4 percent of each entering freshman class may enter without meeting existing admission requirements. Students admitted under this "4 percent rule" are classified as "special action" cases. The reader will find these students included in the "special action" category in Table 3.[7]

For further information on the types of special action deficiency areas the reader is referred to the definition of Admissions Status in Chapter I. Table 3 shows that at UCLA during both 1968 and 1969 larger percentages of EOP regular admits were enrolled than EOP special action students (69 and 65 percent vs 31 and 35 percent). At UCSB, however, the trend is reversed. Few special action cases were found in the L&S populations on both campuses. With the exception of the between campus L&S comparisons, all of the chi-squares were significant.

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[7] For a further breakdown of distribution of students in to types of special action categories see Cherdack (1970).

TABLE 3

Distribution of Admissions Status for EOP and L&S Students

Admissions Status	EOP		L&S		Chi-square
	(N)	%	(N)	%	
UCLA[a]-1968					
Regular Admit	(78)	69	(216)	100	
Special Action	(35)	31	-	-	74.86**
Total	(113)	100	(216)	100	
UCSB[a]-1968					
Regular Admit	(40)	36	(197)	98	
Special Action	(70)	64	(3)	2	153.29**
Total	(110)	100	(200)	100	
(Chi-square)	(100.56)**		(1.56)†		
UCLA[b]-1969					
Regular Admit	(66)	65	(272)	97	
Special Action	(36)	35	(8)	3	64.55**
Total	(102)	100	(280)	100	
UCSB[b]-1969					
Regular Admit	(44)	41	(247)	98	
Special Action	(63)	59	(4)	2	191.65**
Total	(107)	100	(251)	100	
(Chi-square)	(27.04)*		(0.97)†		

[a] 1968 group data
[b] 1969 group data
† p = Not Significant
* $p < .05$
** $p < .01$

TABLE 4

Distribution of Cases of Dismissal and
Withdrawal for EOP and I&S Students

Scholastic Standing	EOP (N)	EOP %	I&S (N)	I&S %	Chi-square
UCLA[a] -1968	(113)[c]	-	(216)	-	
Dismissed	(12)	10	(10)	5	
Withdrew	(8)	7	(14)	6	10.71**
Total Attrition	(20)[d]	18	(24)	11	
UCSB[a] -1968	(110)	-	(200)	-	
Dismissed	(5)	5	(8)	4	
Withdrew	(8)	7	(17)	9	1.45†
Total Attrition	(13)	12	(25)	13	
(Chi-square)	(7.08)**		(9.06)**		
UCLA[b]-1969	(102)	-	(280)	-	
Dismissed	(3)	3	(8)	3	
Withdrew	(5)	5	(21)	7	2.01†
Total Attrition	(8)	8	(29)	10	
UCSB[b] -1969	(107)	-	(251)	-	
Dismissed	-	-	-	-	
Withdrew	(2)	2	(21)	8	52.10**
Total Attrition	(2)	2	(21)	8	
(Chi-square)	(71.02)**		(40.01)**		

Note.-Table reflects attrition data over three quarters of university attendance.

[a] 1968 group data

[b] 1969 group data

[c] Total number of students enrolled fall quarter inclusive through spring quarter.

†p = Not significant

**$p < .01$

Table 4 shows the distribution of cases of dismissal and withdrawal for EOP and I&S students. Here we are interested in determining the rate of attrition among the different groups included in this study. In Table 4 the reader may note that although most of the chi-squares were statistically significant, there were not large differences in the attrition rates of the various groups. The largest dropout rate was 18 percent which occurred for 1968 UCLA EOP students.

The reader should also note that at both UCLA and UCSB the attrition rates for both EOP and L&S decreased in 1969. It appears both institutions were doing a better job at retaining their students. In that the academic aptitudes of the enrolled EOP students in 1969 was not noticably better than that of the 1968 EOP enrollees, as evidenced by predictor variable scores, one could speculate that improvements were made in the programs to bolster retention. For example, the tutor/counseling aspects of EOP could have worked with increased effectiveness.

Having shown that the attrition percentages did not very significantly between our basic comparison groups we will now turn to the performance data concerning the first of our three predictor variables, HSGPA.

Table 5 shows the mean and standard deviation for HSGPA. Here it can be seen that the entering mean HSGPA was higher for entering L&S students during 1968 and 1969 than for EOP students. The within campus EOP vs L&S F-ratios were also significant for all groups with the exception of 1969 UCLA EOP vs L&S. Similarly, Table 4 reveals that UCLA EOP and L&S students achieved slightly higher high school grades than their respective UCSB counterparts; these between campus F-ratios were also significant. One interpretation of the lower high school grades achieved by UCSB EOP students is that more of these students were admitted as special action cases and as such, probably had high school averages below 3.00.

Table 6 shows the means and standard deviations for the second of the predictor variables, SAT-verbal scores. Once again, similar to the results shown in Table 5, the mean SAT-V scores of entering L&S students was higher for entering L&S students during 1968 and 1969 than for EOP students. The within campus F-ratios were, in this instance, all statistically significant. Likewise, UCLA EOP students achieved slightly higher SAT-V scores during both years than UCSB EOP students; these F-ratios were significant. The between campus L&S F-ratios were, however, not significant, thus illustrating less variability in their SAT-V distributions.

It was expected that the EOP groups would score lower on SAT-V than the L&S groups. In that many of the students were from impoverished backgrounds, it was anticipated that their verbal fluency, as a group would be impaired. Moreover, many of the EOP students were Mexican-American. For the majority of these students, low scores were particularly expected since Spanish, rather than English, is probably the basic language spoken in the home. As noted, an analyses of variance revealed the expected significant differences in the within campus comparisons.

TABLE 5

Means and Standard Deviations of High School Grade Point Averages (HSGPA) for EOP and L&S Students

	EOP	L&S	F ratio
UCLA[a] -1968			
Mean HSGPA	3.29	3.47	21.97**
S.D.	.36	.31	
(N)	(113)	(216)	
UCSB[a] -1968			
Mean HSGPA	2.89	3.36	73.16**
S.D.	.51	.42	
(N)	(110)	(200)	
(F ratio)	(44.87)**	(10.79)**	
UCLA[b] -1969			
Mean HSGPA	3.24	3.46	3.07†
S.D.	.37	.35	
(N)	(102)	(280)	
UCSB[b] -1969			
Mean HSGPA	2.95	3.44	29.06**
S.D.	.49	.42	
(N)	(107)	(251)	
(F ratio)	(40.71)**	(20.04)**	

[a] 1968 group data

[b] 1969 group data

†p = Not significant

**$p < .01$

TABLE 6

Means and Standard Deviations of SAT-V Scores for EOP and I&S Students

	EOP	I&S	F ratio
UCLA[a] -1968			
Mean SAT-V	468	557	
S.D.	96.6	86.7	76.51**
Range	210-730	350-780	
Total (N)	(113)	(216)	
USCB[a] -1968			
Mean SAT-V	468	565	
S.D.	96.1	83.9	186.24**
Range	230-650	320-800	
Total (N)	(110)	(200)	
(F ratio)	(10.70)**	(1.00)†	
UCLA[b] -1969			
Mean SAT-V	443	548	
S.D.	84.9	84.4	104.79**
Range	210-730	350-780	
Total (N)	(102)	(280)	
UCSB[b] -1969			
Mean SAT-V	381	548	
S.D.	98.1	82.7	84.16**
Range	240-680	320-800	
Total (N)	(107)	(251)	
(F ratio)	(42.67)**	(3.01)†	

[a] 1968 group data
[b] 1969 group data
†p = Not significant
**p < .01

TABLE 7

Means and Standard Deviations of SAT-M Scores for
EOP and I&S Students

	EOP	I&S	F ratio
UCLA[a]-1968			
Mean SAT-M	495	585	67.63**
S.D.	102.7	88.3	
Range	300-750	350-800	
Total (N)	(113)	(216)	
UCSB[a]-1968			
Mean SAT-M	449	567	112.05**
S.D.	91.7	85.1	
Range	260-640	340-800	
Total (N)	(110)	(200)	
(F ratio)	(12.39)†	(3.64)†	
UCLA[b]-1969			
Mean SAT-M	492	583	97.08**
S.D.	100.0	86.7	
Range	300-750	360-800	
Total (N)	(102)	(280)	
UCSB[b]-1969			
Mean SAT-M	427	578	74.32**
S.D.	88.6	90.9	
Range	240-670	310-800	
Total (N)	(107)	(251)	
(F ratio)	(52.04)**	(8.06)†	

[a] 1968 group data
[b] 1969 group data
†p = Not significant
**$p < .01$

Table 7 is a presentation of the means and standard deviations for the third of the predictor variables, SAT-mathematics scores. With some notable exceptions, the pattern of scoring for this variable is similar to that shown for SAT-V. One exception was that most groups scored higher on SAT-M than on SAT-V. In addition, the standard deviations were also slightly higher for most groups, thus revealing greater variability in the distributions. Analysis of variance showed, once again, significant differences in the within campus comparisons. However, unlike SAT-V, there was no significant difference found in the between-campus EOP comparisons. Similar to SAT-V there was no significant difference found in the between-campus L&S comparisons. Since the mathematics portion of the SAT does not test verbal skills, one could speculate that the SAT-M score perhaps does not penalize a student as much for an apparent lack of verbal ability.

In this study it was also possible to measure how well the SAT scores of the L&S samples reflected the SAT scores of each total campus population. A Report from the Director of Admissions and University Registrar (1969) listed 1968 SAT scores for all nine University of California campuses. The mean 1968 SAT scores listed in this Report for the UCLA and UCSB campuses were practically identical to those shown in Tables 6 and 7. The largest mean score difference (10 points) was found for SAT-M scores on the UCSB campus. The University Report showed the mean SAT-M score for UCSB at 578, while Table 7 shows a mean SAT-M score of 567. The remainder of mean score differences averaged 4 points. The University Report did not list the mean SAT scores for each college within a specific campus.

Having reviewed some of the findings pertaining to distributions of SAT scores and high school averages, let us now turn to Table 8 where the results of an analyses computing mean units attempted together with the means and standard deviations of FGPA are presented.

Table 8 first shows the mean and standard deviation of all courses taken for credit. In compiling these results, courses taken as Pass/Fail were included. These data, as well as the data compiled for FGPA, were obtained for each student's Spring Quarter transcript.[8] Over three quarters, L&S students on the average, tend to take more units for credit than do EOP students; while the typical L&S student attempted about 40 units over three quarters, the typical EOP student attempted about 36 units. For the most part, this difference tends to be about one course (or 4 units). Analyses of variance showed the EOP versus L&S differences to be significant, but the between-campus EOP comparisons were not found to be significant.

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[8] In computing quarterly grade point averages from transcripts the same procedure was followed as used in computing HSGPA. That is, the number of grade points earned was divided by the number of units attempted. However, unlike in determining HSGPA, all courses except those taken as Pass/Fail were counted. In addition, courses graded an "I" (incomplete) were counted as zero points unless removed prior to the time of computation.

TABLE 8

Means and Standard Deviations of Units Attempted and Freshman Grade Point Averages (FGPA) for EOP and I&S Students

	EOP		I&S		F ratio	
	Un. Att.	FGPA	Un. Att.	FGPA		
UCLA[a] -1968	(N=98)		(N=196)			
Mean	35.2	2.64	39.1	2.75	43.82**	21.32**
S.D.	6.2	.45	5.0	.48		
UCSB[a] -1968	(N=100)		(N=183)			
Mean	36.4	2.43	40.2	2.66	46.00**	13.89**
S.D.	6.4	.57	5.4	.48		
(F ratio)	(1.06)†	(0.61)†	(2.70)†	(3.32)†		
UCLA[b] -1969	(N=98)		(N=254)			
Mean	36.1	2.44	40.0	2.83	39.02**	17.02**
S.D.	5.8	.51	5.3	.51		
UCSB[b] -1969	(N=105)		(N=230)			
Mean	36.2	2.34	41.3	2.74	36.05**	20.54**
S.D.	5.4	.64	4.9	.53		
(F ratio)	(1.57)†	(3.10)†	(2.01)†	(1.57)†		

Note.-Abbreviated: Un. Att. = Units Attempted

[a] 1968 group data

[b] 1969 group data

†p = Not significant

**$p < .01$

Table 8 also depicts the differences found in the mean freshman grade point averages computed over three quarters. Similar to units attempted, the FGPA for all I&S groups was higher than those of their respective EOP counterparts. The highest performing group was 1969 UCLA I&S (2.83) and the lowest performing group was 1969 UCSB EOP (2.34). Analyses of variance revealed significant differences in all the within-campus comparisons. Similar to units attempted, no significant differences between campuses were found when both the EOP and I&S groups were compared each year by analyses of variance. Although the mean FGPA was slightly improved for 1969 I&S groups, there was a slight decrease in the mean FGPA for 1969 EOP groups.

As a final note it should be pointed out that Table 8 deals with persisters only. That is, analyses were conducted using the data of only those students who had not dropped from either institution. Moreover, the reader will later note that nonpersisters were not included in the analysis section of this research report. Although it was not incorporated into the design of this investigation, admittedly, an alternative approach using analysis of data for nonpersisters as well could have proven equally fruitful.

Chapter Summary

In this section, descriptions of the two campuses (UCLA and UCSB) were first presented. Both campuses are part of the University of California system, and as such, currently operate an Educational Opportunities Program and a College of Letters and Science. The total enrollment at UCLA was more than twice that of UCSB during the academic year 1968-69.

Two major populations (EOP) and (L&S) were selected for study during Fall Quarter 1968. Identical groups were selected during Fall Quarter 1969 for cross validation purposes. At UCLA, student profile tapes and a computer were utilized in retrieving the samples and gathering the data. At UCSB, most of this was done by hand. Ethnic information was provided mainly by the EOP offices on both campuses. The registrars and admissions offices provided transcripts and admissions data. Distributions for the different demographic and academic variables were presented in tabular form. In most cases, comparisons of these variables were made both within-campuses (UCLA EOP vs UCLA L&S; UCSB EOP vs UCSB L&S) and between-campuses (UCLA EOP vs UCSB EOP; UCLA L&S vs UCSB L&S). In general, analyses were conducted seperately for each year with few statistical comparisons made between the 1968 and 1969 groups.

Overall, more significant differences were found in the between-campus comparisons than in the within-campus comparisons for the groups studied.

What follows is a summary of the significant findings for each of the variables studied. In a related study Cherdack (1970), analyzed additional demographic data gathered on the 1968 groups only. These findings pertaining to age, residence status and choice of major field are also presented in this summary.

1. Sex: Generally, there was an equal distribution of males and females in all groups.
2. Age: The mean age for all groups was slightly over 18 years (Cherdack, 1970).
3. Residence Status: There were low percentages of students enrolled from out of state. Ninety-six percent, or better, of the EOP groups were California residents. Ninety-three percent or better of the L&S groups were California residents (Cherdack, 1970).

4. Ethnic Background: During 1968, the EOP Negro enrollment was larger than that of any of the other ethnic groups; Mexican-American enrollment was second largest, and Oriental enrollment third. During 1969, Negro enrollment increasing to first; Oriental enrollment remained third. American Indian enrollment increased significantly on both campuses during 1969.

5. Admissions Status: There were few special action cases in the L&S samples; larger percentages were found in the EOP groups. The EOP at UCSB enrolled more special action students than the UCLA EOP.

6. Major Area Fields: The largest percentage of students in each group was enrolled as Undecided. In most instances, the choice of a major in physical sciences appeared least popular, while the choice of a major in humanities appeared most popular. Students at UCSB were generally underrepresented in physical science major fields, but majored more in life science fields (Cherdack, 1970).

7. HSGPA: On each campus, the L&S groups had higher mean HSGPA's than the EOP groups. The mean HSGPA for UCLA was higher than that of UCSB EOP, and the mean HSGPA for UCLA L&S was higher than that of UCSB L&S.

8. SAT-V: On each campus, L&S students scored higher than EOP students. The mean SAT-V scores for the UCLA EOP and L&S groups were generally higher than those of their respective UCSB EOP and L&S counterparts.

9. SAT-M: On each campus, L&S students scored higher than EOP students. The mean SAT-M scores for the UCLA EOP and L&S groups were higher than those of their respective UCSB EOP and L&S counterparts.

10. Units Attempted: On each campus, L&S students attempted more units than EOP students; this difference was about 4 units (one course) over a year. UCLA and UCSB EOP students attempted about the same number of units; as did UCLA and UCSB L&S students.

11. FGPA: On each campus, L&S students had higher FGPA's after three quarters than EOP students. The mean FGPA's for UCLA EOP and L&S were slightly higher than those achieved by their respective UCSB EOP and L&S counterparts.

12. Attrition: On each campus, no discernible pattern could be found differentiating the EOP and L&S attrition rates. However, on each campus the attrition percentages for EOP and L&S were lower in 1969 than in 1968.

13. Area Field GPA's: In Cherdack (1970) matched low income EOP and L&S subpopulations were selected from each of the major EOP and L&S groups. These matched groups (EOPLI) and (LSLI) were than compared in grade point averages received in courses taken in the major area fields of physical sciences, life sciences, social sciences and humanities. It was found that more UCSB students enrolled in life science courses and did better in these same courses than UCLA students. In addition, more UCLA students enrolled in physical science courses.

CHAPTER IV

Findings and Analysis

This chapter is divided into four main sections: The first section is devoted to the data concerning the homogeneity of between campus populations and focuses upon the question of whether or not these groups should be combined for additional analyses; the second section concerns the correlational patterns discovered for the populations and various subgroups; the third is devoted to multiple regression analyses; and the fourth covers the data concerning prediction and predictor bias. Since the first three sections of this chapter contain an extensive amount of detailed analysis, the reader is provided with a series of composite tables near the end of the chapter which synthesize these findings.

Comparison of the Major Populations

In the previous section, data were presented separately for each university campus. The plan for this chapter was to combine the between-campus groups where possible. For example, it would have been advantageous to form a single group by combining the UCLA and UCSB EOP students. This would have resulted in an increase in the number of cases, a reduction of sampling error, and in more extensive analyses. Therefore, as a first step, each UCLA major population was compared to its UCSB counterpart to determine whether or not the groups were homogeneous and could be considered as a whole.

In that one method for determining homogeneity between two groups is to compare their multiple regression equations, a computer program based upon the Wilson and Carry (1969) model was developed for this purpose.[9] Table 9 depicts the summary of results obtained when the between campus major populations were compared according to Wilson and Carry.

It will be noted in Table 9 that significant differences were found in the between-campus 1968 and 1969 regression equations when similar groups were contrasted over a 2 year period. Consequently, none of the between-campus EOP or L&S groups were combined for further analyses.

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[9] See Appendix B, for a discussion of multiple regression and the Wilson and Carry (1969) model.

One limitation of being unable to combine groups was that fewer number of cases become available for analyses. This outcome somewhat reduced the amount of hypotheses testing that was originally intended.[10]

TABLE 9

Summary of Comparison of Between Campus Regression Equations for EOP vs L&S Populations

UCLA	UCSB	SS_H [a]	SS_2 [b]	df	F ratio
EOP	vs EOP[a]	31924	-31924	90.3	31.667*
L&S	vs L&S[a]	-14606	23918	175.3	9.825*
EOP	vs EOP[b]	17142	46159	92.3	33.155*
L&S	vs L&S[b]	32760	-48396	243.3	12.947*

[a] 1968 groups
[b] 1969 groups
[c] Residual sum of squares due to variation of individual group (beta) weights about the pooled within class weights.
[d] Residual sum of squares for variation about the regression line in each group.
$^*p < .01$

Correlation Coefficients

To determine what relationship existed between the criterion, FGPA, and the predictor variables, a number of Pearson product-moment correlation coefficients (rs) were computed. Inasmuch as range restriction (as discussed in Linn, 1968) was not found to be a problem in this study, no correction for restriction in range was applied to these correlations.[11]

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[10] Using this same technique Cherdack (1970) found that the between-campus regression equations developed using data for low income Letters and Science students (LSLI) were similar.

[11] As used herein, range restriction refers to the piling up of scores at either the upper or lower limits of the scaled range. When this occurs, a correction factor is commonly applied to compensate for the restriction.

Table 10 shows the correlation coefficients and intercorrelations between the predictor variables for UCLA EOP and I&S students. While the Correlations show the relationship between the predictor variables and the criterion, the intercorrelations show the relationship among the predictor variables themselves. Thus it is revealed that for 1968 and 1969, the HSGPA was the best overall predictor for both UCLA EOP and I&S students. These HSGPA correlations ranged from .341 to .469 and were all significant ($p < .01$); the correlations were somewhat higher for I&S students. SAT-V was significantly correlated ($r = .322$ and $.230$; $p < .05$) with FGPA for I&S students, and for 1969 EOP students ($r = .280$; $p < .05$), but not for 1968 EOP students (.189). SAT-M was a better predictor of FGPA for EOP students ($r = .255$; $p < .05$ and $.380$; $p < .01$) than for I&S students (.164 and .059).

In summary, at UCLA these findings reaffirm the evidence presented earlier in the review of the literature that HSGPA seems to be the best single predictor of college grade point average. It also suggests that SAT-M may be a better overall predictor of FGPA than SAT-V for minority students.

TABLE 10

Correlation Coefficients and Intercorrelations Between Predictor Variables for UCLA EOP and I&S Students

Predictor Variables	EOP				I&S			
	X_1	X_2	X_3	X_4	X_1	X_2	X_3	X_4
(X_1) FGPA	1.000	.365** (.341)**	.189 (.280)*	.255* (.380)**	1.000	.469** (.382)**	.322* (.230)*	.164 (.059)
(X_2) HSGPA		1.000	.082 (.072)	.200 (.409)**		1.000	.245* (.170)	.162 (.163)
(X_3) SAT-V			1.000	.406** (.348)**			1.000	.297* (.330)*
(X_4) SAT-M				1.000				1.000

Note.-Correlations between variables for 1968-69 groups are shown in parentheses. Total (N's) for all groups are as follows:
EOP (1968) = 98, I&S (1968) = 196; EOP (1969) = 98; I&S (1969) = 254.
*$p < .05$
**$p < .01$

Moreover, these data reveal that the UCLA EOP and I&S correlations were relatively low. For both groups, the Board score correlations, in particular, were low enough to cause some questions to be raised concerning their usefulness. As more data are presented herein it will be interesting to follow this development.

Another noteworthy point was that the intercorrelations between the predictor variables were fairly low, although statistically significant in most cases. This indicates that the predictor variables were generally independent of one another. Ideally, this is desirable, provided each predictor variable correlates highly with the criterion measure. Since this did not occur, one could conclude that the predictor variables shared little common variance either among themselves or with the criterion measure.

TABLE 11

Correlation Coefficients and Intercorrelations Between Predictor Variables for UCSB EOP and L&S Students

Predictor Variables	EOP				L&S			
	X_1	X_2	X_3	X_4	X_1	X_2	X_3	X_4
(X_1) FGPA	1.000	.169 (.354)**	.001 (.326)*	-.198 (.022)	1.000	.289* (.237)*	.251* (.252)*	.068 (.133)
(X_2) HSGPA		1.000	.296 (.462)**	.341* (.371)*		1.000	.105 (.173)	.129 (.193)
(X_3) SAT-V			1.000	.508** (.573)**			1.000	.451** (.391)**
(X_4) SAT-M				1.000				1.000

Note.-Correlations between variables for 1968-69 cross validation groups are shown in parentheses. Total (N's) for all groups are as follows: EOP (1968) = 100, L&S (1968) = 183; EOP (1969) = 105, L&S (1969) = 230.

*$p < .05$

**$p < .01$

Table 11 shows the correlation coefficients and intercorrelations between predictor variables for UCSB EOP and L&S patterns. The pattern shown in Table 11 for L&S students closely follows that shown in Table 10. For L&S students, HSGPA and SAT-V correlate significantly with the criterion, FGPA. The HSGPA correlations are, however, less significant and somewhat lower than expected ($r = .289$ and $.237$; $p < .05$). The SAT-V correlations are quite similar ($r = .251$ and $.252$; $p < .05$). Again, the SAT-M correlations were not significant (.068 and .133).

For UCSB EOP students, the findings were less consistent. For the 1968 EOP group, none of the predictor variables was significantly correlated with FGPA. SAT-V showed no relationship, and SAT-M was negatively correlated with the criterion ($r = -.198$). The best positive predictor was still HSGPA (.169). For the 1969 EOP group, the HSGPA and SAT-V correlations show a greater relationship with the criterion ($r = .354$; $p < .01$ and $r = .326$; $p < .05$). The SAT-M correlation was still insignificant. In sum, for UCSB EOP students HSGPA remained a better positive predictor of college grades, but unlike UCLA EOP, SAT-V scores were better positive predictors than SAT-M scores.

Overall, this investigator found the correlation coefficients for UCLA and UCSB EOP and L&S students at or below the lower end of the range of those studies reported earlier and in the literature dealing with white and Negro college students. The correlation coefficients found for 1968 UCSB EOP were well below the range of those reported for white and Negro college students. In that this group displayed such low correlations, further study was conducted through scattergram analysis (Cherdack, 1970). Here it was found that there were numbers of overachievers and underachievers located in the outlying regions of the scattergram plates. The overachievers for the most part, selected courses commensurate with their ability areas, and the underachievers did not.

Tables 12 and 13 have been inserted at this point to help the reader synthesize the correlational findings as presented in Tables 10 and 11. In Table 12, HSGPA is clearly shown as the best overall predictor of college grades. The evidence is less conclusive in revealing a second best predictor. Although SAT-V does seem to predict more effectively than SAT-M for L&S students, no particular trend was observed for EOP students.

TABLE 12

Rank Order of Correlation Coefficients Between the Predictor Variables and the Criterion, FGPA

	UCLA				UCSB			
	EOP[a]	L&S[a]	EOP[b]	L&S[b]	EOP[a]	L&S[a]	EOP[b]	L&S[b]
HSGPA	(1)	(1)	(2)	(1)	(2)	(1)	(1)	(1)
SAT-V	(3)	(2)	(3)	(2)	(3)	(2)	(2)	(2)
SAT-M	(2)	(3)	(1)	(3)	(1)[c]	(3)	(3)	(3)

Note.-Each column ranks the correlation coefficients for each group from highest (1) to lowest (3).

[a] 1968 group data

[b] 1969 group data

[c] Negative correlation

TABLE 13

Composite Table of Results of Tests of Significance Based Upon Correlation Coefficients and Multiple R's Between HSGPA, SAT-V and SAT-M and the Criterion, FGPA

	EOP[a]	L&S[a]	EOP[b]	L&S[b]
HSGPA				
UCLA	.01	.01	.01	.01
UCSB	N.S.	.05	.01	.05
SAT-V				
UCLA	N.S	.05	.05	.05
UCSB	N.S	.05	.05	.05
SAT-M				
UCLA	.05	N.S.	.01	N.S.
UCSB	N.S.	N.S.	N.S.	N.S.
MULTIPLE R				
UCLA	.01	.01	.01	.01
UCSB	.01	.01	.01	.01

Note.-Table shows significance levels of correlation coefficients and Multiple R's.
[a] 1968 group data
[b] 1969 group data
N.S. = Not significant
.05 = $p < .05$
.01 = $p < .01$

Because there were some inconsistencies in the correlational data across campuses, it was of interest to examine next the reliability of the criterion measure, FGPA. We know that grades should show some consistency and stability over a period of time in order to be considered reliable. A lack of consistency in grading patterns could cause some questions to be raised as to whether or not systematic differences really existed, or whether they occurred mainly because of an unreliable criterion measure.

One way to test the reliability of FGPA is to examine the intercorrelations of grades between quarters. Table 14 shows the intercorrelations of grades for the 1968 EOP and L&S groups over three quarters. Here it can be seen that the intercorrelations were higher for the campus L&S than for the campus EOP groups. Moreover, the most reliable relationship should have occurred between Winter and Spring Quarters when there was less attrition. The lowest intercorrelation between these quarters was found for UCSB EOP (.654). However, it should be noted that this intercorrelation was still fairly high and significant statistically. For UCLA EOP students, the intercorrelation was higher (.838), but not as high as UCLA and UCSB L&S (.915 and .902). In sum, in terms of reliability, the criterion measure FGPA was more reliable for the L&S groups than for the EOP groups. The lower intercorrelations for EOP suggest that FGPA is less suitable as a criterion measure for these groups. The investigator, Cherdack (1970) also found that the intercorrelations of grades for low income students selected from these same populations were lowest of all.

TABLE 14

Intercorrelations Between Quarterly Grade Point Averages for EOP and L&S Students

Groups	Fall vs Winter	Winter vs Spring	Fall vs Spring
UCLA			
EOP	.634	.838	.644
L&S	.842	.915	.728
UCSB			
EOP	.642	.654	.624
L&S	.840	.902	.716

Note.-Table reflects 1968 data only.

Multiple Regression Analyses

To test the significance of combining variables to predict the criterion, FGPA, multiple correlations (multiple Rs) were computed. In other words, the multiple R is a measure of the relative importance of the combination of the independent predictor variables. In addition, the coefficients of determination (R^2) was computed. This is a measure of the amount of variance accounted for in the dependent variable, FGPA, by the independent predictor variables.[12]

In computing these data, a stepwise regression computer program was utilized with each group studied. In addition to computing multiple Rs, the technique also computes standard errors of estimate.[13]

Table 15 shows the combined stepwise regression for UCLA and UCSB EOP and LAS students.

TABLE 15

Multiple Rs for UCLA and UCSB EOP and LAS Students

Group	r	R	R^2	SEest
UCLA				
EOP	.3658** (.3909)**	.4182** (.4659)**	.1755 (.2170)	.4182 (.4659)
UCLA				
LAS	.4691** (.3320)**	.5233** (.4211)**	.2739 (.1773)	.4147 (.4669)
UCSB				
EOP	.1971* (.3943)**	.3243** (.4643)**	.1051 (.2156)	.5505 (.5795)
UCSB				
LAS	.2898* (.2517)*	.3792** (.3196)**	.1438 (.1021)	.4455 (.5100)

Note.-Multiple correlations (Rs) between independent variables and criterion (FGPA) for 1968-69 groups are shown in parentheses. Total (N's) for all groups are as follows: EOP (1968) = 98, LAS (1968) = 196; EOP (1969) = 98, LAS (1969) = 254.

*$p < .05$

**$p < .01$

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[12] See Appendix B for a further description of multiple regression.

[13] See Appendix B for a description of standard error of estimate.

Here it can be seen that the multiple Rs obtained by adding variables in combination were significant for all groups ($p < .01$). Although statistically significant, Table 15 shows that the multiple Rs for the UCSB EOP and L&S groups were lower than those of the corresponding UCLA groups; thus indicating more effective predictability on the UCLA campus. The multiple Rs for most groups were within the range (.34 to .82) of those studies reported by Fishman and Pasanella (1960) in their survey of selected studies mentioned earlier in this report.

A final point was that little of the total criterion variance was accounted for by using a combination of all three predictor variables. The fact that the R^2 did not exceed 21 percent for EOP students and 27 percent for L&S students suggests that additional predictors or combinations of predictors must be located and tested in the regression technique to further reduct criterion variance.

Table 16 shows the multiple Rs for EOP and L&S students when sex is held constant. This was analyzed to determine whether or not a student's sex made a difference in prediction. With the exception of 1968 UCLA male EOP students, all of the multiple Rs were significant. When both the 1968 and 1969 EOP and L&S groups are considered, the predictors do not seem to work best for any one sex. One exception is that L&S females do show higher multiple Rs than L&S males. When campus differences are being considered, grades apparently are predicted for males and females better on the UCLA campus. The highest R^2 observed was the 38 percent found for 1969 UCLA EOP males.

Since there were few differences found in predictability when sex was held constant, the question then arose as to what difference, if any, special-action status might have on predictability. Therefore, the next step planned was to hold sex and special-action status constant, and to compute multiple Rs for EOP students. However, as shown earlier the Wilson and Carry (1969) model determined that the between campus EOP regression equations were not similar and should not be combined. Without combining the campus EOP groups, a low number of cases would have been included in a campus regression equation developed holding these same variables constant. For this reason, the multiple regression equations for special-action status were computed seperately.[14] The same problem occurred later when the multiple Rs for ethnicity, sex and special-action status were computed seperately; the low numbers of subjects allowed only for the computation of the multiple Rs of Negro and Mexican-American students. The reader will find supplementary correlation tables for these same groups in Appendix C.

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[14] As a rule, stepwise regression equations were not computed for any group where the total N dropped below thirty-five cases. It was felt that as the number of cases fell below this figure the SE_{est} would become so high that little faith could be placed in the stability of the findings.

TABLE 16

Multiple Rs for Sex for UCLA and UCSB EOP and L&S Students

	(N)	R	R^2	SEest	R^b
UCLA					
EOP					
Male	(40) (40)[a]	.1527† (.6243)**	.0233 (.3898)	.4110 (.4983)	.4182** (.4659)**
Female	(58) (58)	.5819** (.3876)**	.3386 (.1502)	.3898 (.4983)	
L&S					
Male	(95) (120)	.5079** (.3361)**	.2580 (.1128)	.4486 (.4762)	.5233** (.4211)**
Female	(101) (134)	.5492** (.5741)**	.3016 (.3193)	.3823 (.4105)	
UCSB					
EOP					
Male	(51) (44)	.4015** (.5046)**	.1612 (.2546)	.6302 (.6553)	.3243** (.4643)**
Female	(49) (60)	.3609** (.4379)**	.1302 (.1918)	.4358 (.5286)	
L&S					
Male	(92) (118)	.2095* (.2516)*	.0438 (.0635)	.4984 (.5056)	.3972** (.3196)*
Female	(91) (112)	.4323** (.4016)**	.1869 [illegible]	.4097 [illegible]	

Note.-Data for 1969 groups are shown in parentheses.

[a] Second (N) in each category for 1969 groups.

R^b Shows total multiple R for each group as presented in Table 15

p = not significant

**$p < .01$

TABLE 17

Multiple Rs for Special Action Admission Status and Ethnic Background for UCLA EOP and I&S Students

	(N)	R	R^2	SEest	R^b
UCLA					
Special Action	(29) (35)[a]	.2186† (.2793)*	.0477 (.0780)	.5221 (.5083)	.4182** (.4659)**
Negro	(38) (30)	.3909** (.4034)**	.1528 (.1627)	.3973 (.5602)	
Mexican-American	(30) (42)	.6102** (.5085)**	.3724 (.2586)	.3935 (.4587)	
UCSB					
Special Action	(64) (61)	.2887* (.3823)**	.0833 (.1462)	.5826 (.6038)	.3243** (.4643)**
Negro	(57) (42)	.2728* (.4311)**	.0744 (.1859)	.4989 (.6539)	
Mexican-American	(30) (54)	.4405** (.4734)**	.1940 (.2241)	.6716 (.5579)	

Note.-Data for 1969 groups are shown in parentheses directly below data presented for 1968 groups.

[a] Second (N) in each category for 1969 groups.

[b] Shows total multiple R for each group as presented in Table 15.

†p = Not significant

*p < .05

**p < .01

Table 17 shows the multiple Rs for special-action admission status and ethnic background for EOP and I&S students. The reader will note that in a few instances the total N still fell below thirty-five cases. The multiple Rs were computed here primarily because of interest. In these special instances, further research is particularily needed to validate findings.

The multiple Rs for all groups with the exception of 1968 UCLA special-action EOP were significant. The multiple Rs appear to be lowest for the special-action groups. These multiple Rs ranged from .218 to .382. The multiple Rs for Negroes are only slightly better (.272 to .431), while the multiple Rs for Mexican-Americans were best (.440 to .610). The R^2s ranged from a low of 5 percent for 1968 UCLA special-action students to a high of 37 percent for 1968 UCLA Mexican-Americans. This R^2 of 37 percent accounted for the highest degree of variance found in this study.

The predictor variables taken in combination did not predict as well for special-action and Negro students on each campus as they did for each of the total EOP groups. Thus, some variables predicted grades better for Mexican-American students than for the total EOP group. In addition, as shown in Tables 22 and 23, Appendix C, the most consistant positive predictor of grades for each of the special-action, Negro and Mexican-American student groups was HSGPA.

Prediction and Predictor Bias

Another area of inquiry in this study dealth with the differences in prediction found by using the regular campus L&S regression equations, as opposed to using specific subgroup regression equations. An issue is whether the same variables based on L&S normative data, are equally applicable in the prediction of FGPA for different groups of students. More specifically, the question is whether the predictor variables were biased for or against selected subgroups of EOP students? This requires the examination of the statistical differences between the regression equations themselves and, second, the examination of the differences in the predicted and actual grade point averages for the different groups.

Since it would have been advisable to develop a single regression equation based on the data for two consecutive years, the 1968 EOP and L&S regression equations were compared by Wilson and Carry (1969) with the corresponding 1969 EOP and L&S regression equations. It was expected, for instance, that the 1968 UCLA EOP equation would not be different from the 1969 UCLA EOP equation. The cross validating procedure was also followed by subgroups of special action status, sex and ethnic background.

Tables 24 and 25, Appendix D, shows the results of this statistical analyses. Table 24 shows that each of the 1968 UCLA and UCSB EOP and L&S regression equations were statistically different ($p < .01$) from those equations computed for the corresponding 1969 groups. Similarly, the 1968 UCLA EOP male regression equation differed significantly ($p < .01$) with the corresponding 1969 UCLA EOP male equation. The 1968 vs 1969 UCLA EOP special-action, Negro and Mexican-American equations were not significantly different from one another. As shown in Table 25, on the UCSB campus each of the 1968 major populations and subgroup regression equations tested were significantly different ($p < .01$) from the corresponding 1969 equations.

Since in most cases the Wilson and Carry model revealed significant differences between similar groups over two consecutive years, the data were analyzed and presented seperately for each campus during each year. These findings indicate that there was some instability and unreliability in either or both of the predictor/criterion measures. This will be further discussed later in this chapter.

Table 18 shows the multiple regression equations computed for 1968 UCLA EOP, L&S and for each of the various subgroups discussed in this chapter. Each group regression equation is shown in raw score form. The level of significance sign at the right of each equation shows the results of the Wilson and Carry test comparing that group regression equation with the campus L&S regression equation. A non-significant finding indicates that the two compared regression equations were similar and, theoretically, interchangeable.

The predicted FGPAs were computed by using the mean predictor scores for each listed group only in the L&S campus regression equation. This shows what the predicted FGPA would have been for the average student in that group had the L&S regression equation been used. The reader should be careful to note that the equations other than those of the campus L&S groups were not used in computing predictor scores. They are shown here primarily as a matter of interest.

The actual FGPA shows what the mean FGPA was for that particular group. These data were collected directly from college transcripts. The predicted-actual difference shows the direction and amount of under-or overprediction; a plus sign indicating overprediction, and a minus sign underprediction.

Examination of Table 18 reveals that most of the campus group regression equations differed significantly from the campus L&S regression equations. On the UCLA campus, only the Mexican-American EOP vs L&S comparison was not significant. On the UCSB campus, only the special-action EOP vs L&S comparison was not significant. Nevertheless, although statistical differences were found between the compared regression equations, the predicted actual differences indicated that the direction and amount of bias was relatively slight in most cases.

In general, the direction of bias was different on each campus. The only consistent pattern was the underprediction found for special-action EOP students on both campuses. Moreover, the amount of bias was equally small. Thus, apparently the use of the L&S regression equation did not bias the predicted performance of the average student in each subgroup.

At UCLA, no predicted actual difference was found for total EOP, and EOP male students. Slight underpredictions were found for special-action EOP (-.03) and Mexican-American students (-.04). Slight overpredictions were found for Negro EOP (+.02) and female EOP (+.04) students.

Underprediction was found at UCSB for male EOP (-.06), EOP (-.07) and female EOP (-.10). The underprediction for EOP special students (-.05) and EOP Negro students (-.06) was more pronounced. Overpredictin was found only for Mexican-American EOP students (+.03).

TABLE 18

UCLA 1968 Regression Equations and Results of Comparisons of Differences Between Equations

Groups	Regression Equations[a]	Pre- dicted[b] FGPA	Actual FGPA	Diff.[c]
UCLA				
L&S	$Y = .6316H + .0012V + .0002M - .252$[d]	2.73	2.75	-.02
EOP	$Y = .3853H + .0007M + .0003V + .678^{**}$	2.48	2.48	.00
EOP Male	$Y = .0005M + .1008M + .0001V + 1.790^{**}$	2.44	2.44	.00
EOP Female	$Y = .5605H + .0012M + .0001V - .030^{**}$	2.54	2.50	+.04
EOP Negro	$Y = .0011M + .0011V + .1240H + .946^{*}$	2.43	2.41	+.02
EOP Mexican-American	$Y = .6454H + .0009V + .0005M + .225$	2.49	2.53	-.04
EOP Special Action	$Y = .0021V + .0007M + .1417H + 1.185^{**}$	2.29	2.32	-.03

[a] Levels of significance signs at the right of each group equation show results of comparison between group equation and campus L&S equation; abbreviated: H = HSGPA; V = SAT-V; M = SAT-M.

[b] Computed by using mean variable scores for each group in campus L&S equation.

[c] Difference between actual FGPA and predicted FGPA.

[d] Regression equations for groups are shown, although not used in predicting FGPA.

p = Not significant $^{*}p < .05$ $^{**}p < .01$

TABLE 18 (Continued)

UCSB 1968 Regression Equations and Results of Comparisons of Differences Between Equations

Groups	Regression Equations[a]	Pre-dicted[b] FGPA	Actual FGPA	Diff.[c]
UCSB				
L&S	$Y = .3215H + .0015V - .0004M + .958^{d}$	2.66	2.66	.00
EOP	$Y = .0020M + .2789H + .0005V + 2.271^{**}$	2.35	2.42	-.07
EOP Male	$Y = .0034M + .2994H + .0004V + 2.937^{**}$	2.30	2.36	-.06
EOP Female	$Y = .2804H + .0009V + .0006M + 1.543^{**}$	2.39	2.49	-.10
EOP Negro	$Y = .2014H + .0013M + .0011V + 1.996^{**}$	2.30	2.46	-.16
EOP Mexican-American	$Y = .0028M + .4158H + .0001V + 2.502^{**}$	2.40	2.37	+.03
EOP Special Action	$Y = .0014M + .2370H - .0004V + 2.571$	2.23	2.38	-.15

Moreover, the EOP Negro data in Table 18 confirms the findings of Cleary (1968). In her study Cleary found little evidence that the Scholastic Aptitude Test was biased as a predictor of grades. In two eastern colleges where SAT-V and SAT-M scores alone were used as predictor variables, Cleary did not find any significant differences in the regression line for Negro and white students. In the one southwestern college she studied, Cleary did find a significant difference in the regression lines for Negro and white students. At that college, Cleary used the combination of high school average, SAT-V, and SAT-M scores to predict the college grades. In addition, using the Negro mean scores in the white regression equation, Cleary found a slight overprediction for Negro students. She also found slight differences in both over-and underprediction between Negro and white groups in the two eastern colleges.

Table 19 shows the identical comparisons for 1969 EOP and L&S students on each campus. All but one of the UCLA subgroup equations differed significantly with the UCLA L&S regression equation; all but one of the UCSB equations were significantly different from the UCSB L&S regression equation.

At UCLA, for most groups there were underpredictions found between the predicted and actual FGPA's. In two instances, EOP male and EOP Mexican-American, these underpredictions were (-.01 and -.07) less than one-tenth of a grade point. The underpredictions were slightly larger for EOP female (-.26) and EOP Negro (-.30), but small for total EOP (-.04). The greatest underprediction in this study was found for EOP special-action students (-.78).

At UCSB, the direction of bias varied. Slight overpredictions were found for EOP female (+.01) and EOP Negro (+.02); more pronounced underpredictions were found for EOP males (-.14) and EOP special-action students (-.29).

Summary of Predictor Bias

Overall, the data revealed in Tables 16 and 17 do not support the premise that a strong SAT predictor bias exists either for or against minority freshmen. An argument can be made that for EOP special-action students a slight bias in the direction of underprediction does exist, in that for these students a consistent negative trend was shown in each instance. It may be that the selection of EOP special-action students is a worthwile risk in that they achieve better grades than expected as determined by their HSGPA's and SAT scores.

Finally, it should not be overlooked that, although there was no bias in prediction either for or against minority freshmen, the SAT scores themselves, as shown, did not correlate well for any group. The implications of the findings presented in this chapter have relevance throughout higher education. In Chapter V a final summary will be presented, together with a discussion of some of these implications.

TABLE 19

UCLA 1969 Regression Equations and Results of Comparisons of Differences Between Equations

Groups	Regression Equations[a]	Predicted[b] FGPA	Actual FGPA	Diff.[c]
UCLA				
I&S	$Y = .5377H + .0011V - .0003M + .548$	2.83	2.83	.00
EOP	$Y = .0011M + .3295H + .0011V + .316^{**}$	2.40	2.44	-.04
EOP Male	$Y = .7020H + .0021V + .0004M - .909^{\dagger}$	2.48	2.49	-.01
EOP Female	$Y = .0014M + .2074H + .0005V + .791^{**}$	2.15	2.41	-.26
EOP Negro	$Y = .0022M + .1688H + .0004V + .510^{**}$	2.06	2.36	-.30
EOP Mexican-American	$Y = .4524H + .0008M + .0008V + .166^{**}$	2.31	2.38	-.07
EOP Special Action	$Y = .0016V + .0001M - .0316H + 1.507^{**}$	2.13	2.91	-.78

[a] Levels of significance signs at the right of each group equation show results of comparison between group equation and campus L&S equation; abbreviated: H = HSGPA; V = SAT-V; M = SAT-M.

[b] Computed by using mean variable scores for each group in campus L&S equation.

[c] Difference between actual FGPA and predicted FGPA.

[d] Regression equations for groups are shown, although not used in predicting FGPA.

†p = Not significant *$p < .05$ **$p < .01$

TABLE 19 (Continued)

UCSB 1969 Regression Equations and Results of Comparisons of Differences Between Equations

Groups	Regression Equations[a]	Predicted[b] FGPA	Actual FGPA	Diff.[c]
UCSB				
LAS	$Y = .0013V + .2960H + .0001M + .923$	2.74	2.74	.00
EOP	$Y = .3887H + .0023V - .0021M + 1.0990^{**}$	2.34	2.34	.00
EOP Male	$Y = .0037V - .0031M + .3949H + .900^{**}$	2.10	2.24	-.14
EOP Female	$Y = .4017H + .0013V - .0012M + 1.163^{**}$	2.43	2.42	+.01
EOP Negro	$Y = .4848H - .0029M + .0021V + 1.261^{**}$	3.32	2.30	+.02
EOP Mexican-American	$Y = .0022V + .3485H - .0017M + 1.093^{**}$	2.37	2.37	.00
EOP Special Action	$Y = .0031V - .0025M + .2272H + 1.364^{\dagger}$	2.33	2.62	-.29

[a] Levels of significance signs at the right of each group equation show results of comparison between group equation and campus L&S equation; abbreviated: H = HSGPA; V = SAT-V; M = SAT-M.

[b] Computed by using mean variable scores for each group in campus L&S equation.

[c] Difference between actual FGPA and predicted FGPA.

[d] Regression equations for groups are shown, although not used in predicting FGPA.

†p = Not significant $\quad$ *$p < .05$ $\quad$ **$p < .01$

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this investigation was to analyze and evaluate the predictive validity of the verbal and mathematics portions of the Scholastic Aptitude Test (SAT-V and SAT-M) of the College Entrance Examination Board and high school averages (HSGPA) for a selected group of disadvantaged minority freshmen. The disadvantaged student was defined herein as one who is economically, educationally, geographically or culturally deprived. The criterion measure was freshman grade point average (FGPA) as measured at the culmination of three quarters of university attendance. A second, related purpose of the investigation was to determine whether or not a test bias, either in favor of or against minority freshmen, existed when the predictor variables (SAT-V, SAT-M and HSGPA) were employed in a single prediction formula applicable to all students.

The major group studied was the Fall 1968 class of minority freshmen enrolled in the Educational Opportunities Program (EOP) at the University of California, Santa Barbara. In order to further corroborate these findings identical groups of Fall 1969 EOP freshmen were selected for cross validation purposes. Thus data were available and analyzed for two consecutive EOP classes, which it is felt, strengthened this investigation immeasurably. The EOP students selected were enrolled in the Colleges of Letters and Science at their respective universities; control samples of non-EOP Letters and Science freshmen (LAS) were added for comparison purposes. The LAS students were predominantly white, and represented about one in every ten freshmen in the two Colleges of Letters and Science.

In addition, specific subgroups from each campus were examined separately to determine the existence of any unique relationship between a specified background and performance in the present context. The subgroups included EOP students selected on the basis of ethnic background, sex, and "special-action" status. Special-action students were those admitted with a risk classification denoting admission with below-the acceptable-university standards.

The Wilson and Carry statistical technique was employed to test for homogeneity of two groups prior to combining them. The between campus comparisons (UCLA EOP vs UCSB EOP, UCLA LAS vs UCSB LAS) showed that none of the compared groups were alike. Consequently, these groups were not combined but were analyzed separately.

What follows is a general summary synthesizing the common findings. This is followed by a detailed summarisation of the results of hypothesis testing, a section stating conclusions, and finally a discussion dealing with some implications and recommendations.

General Summary

Overall, the correlations between the predictor variables, SAT-V, SAT-M and HSGPA, and the criterion, FGPA, were low. High school grade point average correlated the highest for most groups. SAT-V and HSGPA correlated higher with the criterion for regular white L&S students. In general, SAT-M correlated better with the criterion than SAT-V for minority EOP students; in one instance this correlation was negative.

Taken in combination, the predictor variables worked only slightly better than when considered independently. Adding SAT scores to HSGPA to improve prediction seemed worthwhile for L&S students; the improvement was less for EOP students. The total criterion variance accounted for through the use of the predictors in combination was small for all groups tested.

Major differences were found in the correlational data of the sister institutions. The UCLA correlations were systematically higher than those for UCSB. Similarly, the within campus comparisons (i.e., UCLA L&S vs UCLA EOP) revealed higher correlations for the L&S than for the EOP groups.

The reliability of college grades as a suitable criterion measure was investigated. Examination of the intercorrelations of quarterly grade point averages showed EOP intercorrelations to be generally lower and somewhat less reliable than those found for L&S. However, in most cases the intercorrelations discovered were fairly high and also highly significant.

The SAT-V vs FGPA correlations for females were generally higher than those for males. Male EOP students were shown to have particularly low correlations. The special-action, Mexican-American, and Negro groups all generally displayed lower correlations than those for other groups. At UCSB, the Board scores correlated negatively with the criterion for special-action and Negro students.

Few of the campus regression equations developed for the 1968 groups could be validated using the data for the identical 1969 groups. This raises certain questions which will be discussed in the implications section of this report.

No major evidence of test bias was found in this study. When a white regression equation computed for L&S students was used to predict the FGPA of typical EOP students and subgroups of EOP students (male, female, special-action, Negro and Mexican-American) only slight differences were found between their predicted grades and the grades they actually received. This was true in spite of the fact that Wilson and Carry tests showed that the differences between the L&S and EOP regression equations were, in general, statistically significant. Cherdack (1970) also found nonsignificant differences when predicted grades of low income EOP and L&S students were contrasted with the actual grades received by these same students. It was noted that for EOP special-action students a consistent trend in underprediction was found for all groups tested. Furthermore, the greatest underprediction (-.78) was discovered for one EOP special-action group; the other special-action underpredictions, although negative, were less pronounced.

Summarization of Hypothesis Testing

A detailed summary of the results of hypothesis testing follows. In those cases where a significant correlation or multiple correlation was found, the null hypothesis was rejected; a nonsignificant finding resulted in acceptance of the null hypotheses.

All hypotheses have been restated; findings related to each are summarized immediately below the stated hypotheses.

Hypothesis 1. There is no significant correlation between each of the independent predictor variables, SAT-V, SAT-M, HSGPA and the criterion, FGPA, for EOP and L&S.

1. For 1968 and 1969 UCLA EOP students all the correlations were significant with the exception of one; an insignificant correlation ($r = .189$) was found between SAT-V and FGPA for 1968 UCLA EOP. The significant r's ranged from .255 ($p < .05$) to .380 ($p < .01$). Thus, in almost each instance the null hypotheses was rejected.

2. For 1968 and 1969 UCSB EOP students an inconsistant pattern emerged. For 1968 EOP students, none of the r's computed were significant. For 1969 students, significant r's were found between the criterion and HSGPA (.354; $p < .01$) and SAT-V (.326; $p < .05$). The correlation between the criterion and SAT-M was not significant. Thus, in only the two instances of significant r's was the null hypothesis rejected for UCSB EOP students.

3. For 1968 and 1969 UCLA L&S students the correlations between the criterion and HSGPA and SAT-V, were significant. In each case, the null hypothesis, therefore, rejected. These significant r's ranged from .230 to .469. No significant r's were found between the criterion and SAT-M scores (.164 and .059).

4. For 1968 and 1969 UCSB L&S students identical findings were discovered. That is, significant correlations were found between the criterion and HSGPA and SAT-V, but no significant correlations were found for SAT-M scores. The significant r's ranged from .237 ($p < .05$) to .289 ($p < .05$). The nonsignificant r's were .068 and .133. Thus, the null hypothesis rejected for HSGPA and SAT-V, but was accepted for SAT-M.

Hypothesis 2. There is no increased significant multiple correlation when the independent variables are combined to predict the criterion for EOP and L&S.

5. The multiple Rs computed when the predictor variables were combined for 1968 and 1969 EOP and L&S groups were, in each case, higher and significant. Thus, for each group, the null hypothesis rejected. The multiple Rs ranged from a low of .319 ($p < .05$) for 1969 UCSB L&S to a high of .523 ($p < .01$) for 1968 UCLA L&S.

Hypothesis 3. There are no significant multiple correlations found for EOP and L&S when sex is held constant.

6. The multiple Rs computed when the predictor variables were combined and sex was held constant were significant in every instance except one. The multiple R found for 1968 UCLA EOP males was insignificant (.152). The null hypothesis rejected for all other groups. The significant multiple Rs ranged from a low of .209 ($p \leq .05$) for 1969 UCSB L&S males to a high of .642 ($p < .01$) for 1969 UCLA EOP males.

Hypothesis 4. There are no significant multiple correlations found for EOP when special-action admissions status and sex are held constant.[15]

7. The multiple Rs for special-action admissions status were significant for all groups tested with the exception of 1968 UCLA EOP. For the special-action students in this group, the multiple R only reached .218. For all other groups, the null hypothesis, therefore, rejected. The significant multiple Rs ranged from a low of .279 ($p < .05$) for 1969 UCLA EOP special-action to a high of .382 ($p < .05$) for 1969 UCSB EOP special-action.

Hypothesis 5. There are no significant multiple correlations found for EOP when ethnicity, sex and special-action admissions status are held constant.

As before, the paucity of numbers allowed only for an examination of a limited group. In this case, Negro and Mexican-American ethnic backgrounds alone were held constant.

8. The multiple Rs computed seperately for Negro and Mexican-American ethnic background were significant in each instance. The null hypothesis, therefore, completely rejected. For EOP Negro students; the multiple Rs ranged from a low of .272 ($p < .05$) for 1968 UCSB, to a high of .403 ($p < .01$) for 1969 UCLA. For Mexican-American students the multiple Rs ranged from a low of .440 ($p < .01$) for 1968 UCSB, to a high of .610 ($p < .01$) for 1968 UCLA.

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[15] Due to a paucity of numbers, only special-action admission status was held constant.

Hypothesis 6. There are no significant differences in the multiple regression equations found between the respective L&S major populations and the EOP population and selected EOP subgroups within each campus.

9. The Wilson and Carry test revealed significant differences between the L&S regression equations and the EOP regression equation on each campus. Likewise, significant differences were found between most of the L&S regression equations and the regression equations for the campus subgroups. More specifically, at UCLA during 1968 significant differences were found between the L&S regression equation and the regression equations for total EOP, EOP male, EOP female, EOP Negro and EOP special-action students. At UCLA during 1969 significant differences were found for EOP, EOP female, EOP Negro, EOP Mexican-American and EOP special-action students. Thus, at UCLA, the null hypothesis rejected for all these groups. The Wilson and Carry test did not reveal significant differences between the 1968 UCLA L&S regression equation and 1968 EOP Mexican-American equation, and the 1969 L&S equation and 1969 EOP male equation.

At UCSB, significant differences were found between the 1968 L&S regression equation and 1968 EOP, EOP male, EOP female, EOP Negro, and the EOP Mexican-American regression equations. During 1969, significant differences were found between the 1969 L&S regression equation and equations developed for EOP, EOP male, EOP female, EOP Negro, and EOP Mexican-American. Thus, at UCSB, the null hypothesis rejected for all these groups. The Wilson and Carry test did not reveal significant differences between the 1968 UCSB L&S regression equation and 1968 EOP special-action, and between the 1969 UCSB L&S regression equation and 1969 UCSB special-action equation. For these comparisons the null hypothesis was accepted.

Conclusions

Although there were some inconsistencies in the data, trends did emerge which suggested certain inferences concerning the suitability of SAT scores and high school grades as predictors of freshman grade point averages. The following conclusions were reached in this study.

1. The best overall predictor of academic performance for EOP and L&S students was their HSGPA. Moreover, even when a combination of SAT scores and HSGPA were used to predict college grades, the HSGPA still contributed the most to predictability.

2. The amount of criterion variance accounted for through the use of the predictors, separately and in combination, was low for all groups. In sum, none of these variables seems particularly good in predicting the criterion FGPA.

3. None of the predictor variables seems useful for EOP special-action students, as evidenced by the low correlations with FGPA. Either separately or in combination, the correlations found for these students are low.

4. HSGPA predicts better for Mexican-American students then for Negro students. None of the variables consistently predicts well for EOP Negroes. Although SAT-M appeared to be a fairly good predictor for Negroes at UCLA, the low N made even this correlation suspect.

5. HSGPA was the best overall predictor for both males and females. The data did not consistently reveal any second best predictor for sex.

6. The criterion measure, FGPA, is less reliable for EOP students than for L&S students.

7. There is little evidence to conclude that a large number of Negro, Mexican-American, male or female EOP students do better than expected. There is ample evidence to conclude that a larger portion of special-action students achieve better grades than expected.

8. In predicting FGPA, the use of a common L&S white regression equation for most groups of minority freshmen does not appear to bias the results significantly.

Implications

The findings of this investigation have raised questions concerning the value of using SAT scores as predictors, and college grades as a criterion measure in determining who shall be admitted to an institution of higher learning. In fact, these findings have led this investigator to believe that much of the data presented herein is suspect due to the unsuitability of the criterion measure itself, among other things.

The fact that the criterion measure, FGPA, was not as reliable for minority freshmen raises questions concerning the entire purpose of correlation studies. If, indeed, grades are not a suitable measure, admissions officers and those engaged in the selection of disadvantaged students to their institutions must become aware of this and begin to search for more meaningful criteria. Measures dealing with attitudes, values and biographical data would seem to offer promise for this purpose, as noted in the recommendations to follow.

There does seem to be more merit in using FGPA as a criterion for white populations since the reliability of grades was slightly better for L&S students. Nevertheless, if grades are reliable, there seems to be little value in using predictor variables that account for so small a part of the criterion variance. Three predictor variables which, in combination, account for less than 25 percent of the total criterion variance, leave 75 percent yet to be accounted for through other means. While it is agreed that employment of HSGPA does seem worthwhile, other types of variables should also be carefully considered and, if found effective, added to improve the predictability of college grades.

Throughout this investigation the pattern in the data presented for UCLA was shown to contrast clearly with that for UCSB. The data revealed for UCLA EOP and I&S, for example, indicated that the correlations between the predictors and the criterion were generally higher than those of their EOP and I&S counterparts at UCSB. These differences appeared almost systematic. Inasmuch as UCLA and UCSB are sister institutions, having the same admission requirements, this was not expected. Moreover, had the Wilson and Carry test not been first used in testing for the homogeneity of between-campus groups, this revelation might have passed unnoticed. This investigator is inclined to speculate that there are clearcut reasons for the inconsistencies in the between-campus data.[16]

The fact that some EOP students with good HSGPA's achieved low freshman grades suggests the value of using a high school grade point differential in selection procedures. A 3.00 HSGPA in an all-Negro, ghetto high school might predict a lower college performance than the same average from a white, middle-class high school. Moreover, it was shown that HSGPA correlated higher with college grades for Mexican-Americans than for Negroes. It could be that grades were harder to earn at the Mexican-American high schools, with the result that a good performance in high school for a Mexican-American would be more indicative of a potential for doing college work. If the use of a differential in performance were continually calculated, a prediction formula could be developed. The role of the high school differential can certainly help in equalizing admission policies and assisting in the counseling of new students.

One final point is that the assistance rendered by the college counselor to the new student in the selection of a program of courses could influence his performance considerably. The proper kind of guidance and counseling seems particularly important in the case of the "risk" student, who often needs special attention. One might speculate that the orientations of the counselors on the two campuses may have differed in this area, consequently contributing to the contrasting results. Clearly, there is need for further exploration of this possibility.

The data presented also imply that the grading policies may vary on the two campuses. Minority students may be helped or hindered through the awarding of grades by biased instructors. For example, if the instructors on one campus gave higher grades either to whites or non-whites as a group, the correlation coefficients might reflect this. If instructors were to bias their grading for or against minority freshmen, however, this would most likely occur in classes with low enrollment where students are more identifiable. If the correlational differences were found to be caused by the preferential or nonpreferential grading of minority freshmen, the entire grading system would need to be overhauled.

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[16] Although not shown here Cherdack (1970) investigated these between campus differences. Among other things, Cherdack found (1) differences in the patterns of courses selected by UCLA and UCSB students; i.e., UCSB students seemed to shy away from physical science courses while UCLA students did not (2) the selection of courses by UCLA students more aligned with their ability areas, as measured by SAT scores.

The fact that many of the correlation coefficients and regression equations computed for specific 1968 groups were dissimilar when compared to the identical incoming 1969 groups causes some serious questions to be raised. The lack of cross validation shows inconsistency in the data and suggests, once again, the unreliability and instability in prediction for the groups studied. Of all the groups tested, only the 1968 UCLA regression equations developed for EOP special-action, Negro and Mexican-American were valid for use with the corresponding 1969 UCLA groups. These were the only instances in which a common regression equation could have seriously varied the predicted results. For increased accuracy, a seperate formula probably needs to be developed for minority students based upon the data for the most current year. Until more effective predictors can be found, and increased reliability established, this investigator supports the premise of more open-door type admissions policies. To penalize minority students, because of the existence of admissions policies based upon assumptions made from inaccurate and antiquated information has to be a travesty bearing upon the very roots of equality of educational opportunity.

A final point is that, as noted, the minority student in terms of predicted versus actual performance does not appear to be discriminated against when current white student norms are used to predict his performance.

It may be that the minority student in this study is less like the minority student in Southern Negro colleges who participated in earlier studies of prediction, and more like his white counterpart in terms of such things as values, attitudes, inspirations, and socioeconomic status. The fact that the minority students' SAT scores were high enough in this study to make it unnecessary to apply a correction to the correlations for restriction in range provided evidence of their academic ability. Moreover, it should be noted that although the SAT correlations cited in the literature were found to be as good for Negro students in Southern Negro colleges as for white students in white colleges, these data tend to support the thesis that SAT scores may not be as good for minority students in white colleges.

Recommendations for Further Study

1. The lack of consistency revealed in the findings of this investigation suggest the desirability of a large scale study of entire institutional systems. Such a study should focus upon the criteria used for selection, awarding of financial aids, grading policies, counseling procedures and patterns of courses selected for minority and nonminority students.

2. Although this investigation made an inroad by studying students from, risk, male and female, and Negro and Mexican-American backgrounds, data collected on other campus subgroups, such as sororities and veterans, should also be analyzed to discover whether or not major differences in correlations exist. Perhaps the characteristics of members of such groups affect their group performance and consequently distinguish them from other campus groups. For instance, it is felt in some circles that veterans are more highly motivated for superior achievement.

3. Research studies should be conducted comparing students who select the same courses. In a related study Cherdack (1970) grouped students in area field disciplines; it might be more meaningful to match students on certain selected courses. By limiting a study to individuals taking the same course, differences in grading patterns cannot be so easily attributed to the selection of easier courses, or to more lenient instructors within a field. This should help in establishing increased reliability of the criterion measure.

4. It seems important to conduct research studies for the purpose of locating variables other than the traditional ones in order to improve the level of predicting college grades or some other, perhaps better, criterion measures for minority students. It is the opinion of this investigator that several untapped areas which could prove fruitful include measures dealing with attitudes, achievement motivation, perseverance, values, expectations, ideas and procedures, family life, activities, study habits, and biographical data. It would appear that, particularly for the minority group student, an examination of his often unique, culturally different environment may reveal success variables not previously considered.

5. Further experimentation should be conducted in the use of the high school differential for the selection and counseling of college students.

6. An examination of SAT test bias with the exclusion of high school grades is encouraged. HSGPA was generally the most powerful predictor of FGPA in the present study. This poses the question of what would happen if HSGPA were eliminated from the regression equation and SAT scores alone were used?

7. It is strongly recommended that researchers working with prediction paradigms adopt a valid statistical method of testing the homogeneity of groups prior to combining them for analysis. All too often studies proceed on the basis of assuming homogeneity when indeed this may not exist. In the present study it did make a difference to test prior to combining, since most groups were not homogeneous.

8. Finally, the findings in this study warrant further investigation into the possible existence of a test bias that may underpredict the performance of special-action "risk" students. In particular, if a bias is found studies should be conducted to determine the characteristics of those successful and unsuccessful "risk" students.

* * * *

The present investigation represents a single step in the long road leading to perfecting our institutional policies in admission and grading procedures. Indeed, there is much more to be done if equity in admissions standards for all students is to be achieved on a nation-wide basis. Investigation of the many unanswered research questions raised in this and other studies reported in the literature seems mandatory under the circumstances. Once this concerted effort is made that road toward equity for the diversity of students will become much shorter.

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APPENDIX A

TEST INSTRUMENT-SAT

The Scholastic Aptitude Test

The SAT is a three-hour objective test designed to measure how well a student has developed his verbal and mathematical skills. The test is sponsored by the College Entrance Examination Board (CEEB), a nonprofit membership organization that provides tests and other educational services for schools and colleges. It is prepared by the professional staff of the Educational Testing Service (ETS) under the supervision of a committee appointed by the College Board. The work of the committee, the colleges, test specialists, statisticians and research psychologists helps to make the SAT one of the most widely used and reputable aptitude tests for college candidates in the United States.

The primary purpose of the test is to provide college officials with information so that they can select the most promising students for their institutions. The SAT provides a standard measure of academic ability, a measure that enables colleges to make a fair comparison of each student's performance with the performance of applicants from other schools.

The SAT is designed to measure the student's general ability to use language and mathematical concepts in the solution of the kinds of intellectual problems the candidate would encounter in college. Two scores, verbal (based upon antonyms, sentence completion, analogies, and reading comprehension items) and mathematical (based upon word problems and data sufficiency items) are reported on a scale between 200 and 800. Normative data are based upon all twelfth grade students who took the tests in April 1941. The mean standard rating for the reference group was set at 500 and the standard deviation of the ratings at 100 (Dyer and King, pp. 101-102).

Many of the statistical analyses of the SAT were conducted during the period from 1959-1962. In general, the median test reliability coefficients are approximately .89 for the verbal scale and .85 for the mathematical scale. The Kuder-Richardson formula 20 reliability coefficients given for fourteen forms of the SAT introduced during the same period listed the verbal test reliabilities from .88 to .91 and the mathematics test reliabilities from .87 to .91 (Buros, p. 449).

The SAT was first administered in June, 1926 to a total of 8040 candidates. The test was considered at that time to be "experimental" and, while twenty-three colleges received scores for ten or more candidates, it is likely that in most cases decisions regarding admission or rejection were made without reference to the test scores (Coffman, 1963).

In contrast to these fugures, during the academic year, 1969-70 over 1,000,000 candidates throughout the United States and in many foreign centers are expected to take the SAT (CEEB, 1969). More than 1200 colleges, universitites, and secondary schools are currently members of the College Board.

Over the years, an examination of successive forms of the SAT suggest that changes subsequent to the original period of development have been minor. While new approaches have been tried, the SAT still retains much of its original format and content. From time to time, however, promising new item types have been identified and added to the SAT, while other items found to be invalid have been eliminated.

The University of California, beginning Fall Quarter, 1968, required that all candidates for admission take the test. The University had not required the SAT since 1961, when it was last dropped as a requirement.

APPENDIX B

STATISTICAL DATA

(1) The chi-square test is used in testing the agreement between observations and hypotheses in those instances where non-continuous data can be classified into mutually exclusive categories. The chi-square indicates a relationship betwsen observed cell frequencies agree with the hypothetical, chi-square (X^2) value indicates that the groups arose by random sampling from the same population. A statistically non-significant chi-square value indicates that the groups arose by random sampling from the same population. A statistically significant chi-square value indicates that the groups would be assumed to come from different populations.

(2) Analysis of variance examines the ratio found between the within-group variance and between-group variance. This ratio has a specific sampling distribution, f. If the F ratio is not significant the assumption is that the groups arose by random sampling from the same population. Analysis of variance is commonly used in comparing variances found for continuous data.

(3) Multiple regression analyses are constructed from beta weights and predictor variable scores. The beta weights (B's) are calculated to discover the amount of weight each predictor variable contributes to overall prediction. The predicted dependent variable (FGPA) is obtained by summing each of the independent variables times its respective beta weight. An example of a regression equation presented in normalized form follows:

$$Y^1 = B_1 (X_1) + B_2 (X_2) = B_3 (X_3)$$

where Y^1 = predicted FGPA

$B_{1...3}$ is the beta weight assigned to each independent variable score.

$X_{1...3}$ represents independent variable scores, i.e., X_1 = (HSGPA); X_2 = (SAT_V; X_3 = (SAT-M).

(4) Wilson and Carry Model

This technique compares the beta weights within and between two regression equations. Two residual sums of squares are computed. The first residual sum of squares (SS_H) is the sum of squares due to variation of individual group beta weights about the pooled within class beta weights; the second (SS_2) is the sum of squares for variation about the regression line in each group. The difference in these residual sums of squares is then tested by an F ratio. If no differences exist, then the two regression equations are considered to be from the same population and justification for combining the groups is assured. As presented by Wilson and Carry (pp. 81-81) the general problem is as follows:

Given: (1) g groups for which some comparison is to be made.

(2) Each unit of analyses has a score of p=1 variables

Y = dependent variable

X_1 = independent variables $i = 1, \ldots p$

(3) Consider the regression of Y on X_1 for each group. Thus g vectors of regression (beta) weights are defined. Each vector contains p weights, one for each predictor variable. Question: Do these g vectors of p regression weights differ? The F test formula for the Wilson and Carry test is given as:

$$F = \frac{SS_H}{SS_2} \cdot \frac{n-g-g \cdot p}{(g-1) \cdot p} \quad \text{where}$$

$n-g-g \cdot p$ = degrees of freedom for SS_2, and

$(g-1) \cdot p$ = degrees of freedom for SS_H.

(5) The stepwise regression program computes a sequence of multiple regression equations in a stepwise manner. The program first selects that independent variable which contributes most to predicting the criterion. At each step the next most contributive variable is added, and an F is obtained. This F entered provides a measure of the strength of each new variable added, which, in turn, reduces the error in the sum of squares.

(6) The standard error of estimate (SE_{est}) is a measure that indicates how much the predicted value of the regression equation may vary from the actual value. For example, if the SE_{est} = .50 and the predicted FGPA = 3.5, it can be said that approximately two thirds of the time the actual FGPA will be found between 3.00 and 4.00.

APPENDIX C

SUPPLEMENTARY CORRELATION TABLES

TABLE 20

Mean, Standard Deviations and Correlation Coefficients Between Predictor Variables and FGPA for 1968 UCLA and UCSB EOP and L&S Students when Sex Is Held Constant

Predictor Variables	EOP						L&S					
	Male			Female			Male			Female		
	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r
UCLA		(N=46)			(N=67)			(N=108)			(N=111)	
HSGPA	3.21	.34	.103	3.37	.35	.514**	3.47	32.0	.461**	3.49	.30	.474**
SAT-V	466.9	103.4	.030	478.1	91.5	.412**	560.0	83.6	.244*	552.2	88.5	.418**
SAT-M	540.0	88.8	.132	481.8	104.2	.296*	629.6	75.5	.172	541.5	78.1	.318**
UCSB		(N=51)			(N=49)			(N=92)			(N=91)	
HSGPA	2.79	.53	.042	2.98	.51	.322*	3.28	.44	.209*	3.43	.37	.349**
SAT-V	426.8	91.5	-.125	433.0	77.7	.204	557.7	89.9	.183	565.8	79.5	.323**
SAT-M	470.5	92.2	-.335*	430.0	89.6	.063	595.5	96.3	.016	537.3	85.7	.240*

$*p < .05$
$**p < .01$

TABLE 21

Means, Standard Deviations and Correlation Coefficients Between Predictor Variables and FGPA for 1968 UCLA and UCSB EOP and L&S Students when Sex Is Held Constant

Predictor Variables	EOP						L&S					
	Male			Female			Male			Female		
	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r
UCLA		(N=40)			(N=58)			(N=120)			(N=134)	
HSGPA	3.20	.33	.476**	3.27	.39	.283*	3.52	29.0	.312	3.43	.31	.434**
SAT-V	446.5	89.2	.360*	440.3	82.6	.221**	563.1	101.2	.247*	555.7	81.5	.392**
SAT-M	526.0	107.2	.410	468.1	87.8	.352*	641.3	65.9	.176	550.2	79.2	.321**
UCSB		(N=44)			(N=49)			(N=118)			(N=112)	
HSGPA	2.91	.49	.305*	2.98	.49	.395*	3.23	.50	.242*	3.51	.41	.356**
SAT-V	439.3	96.4	-.396**	427.0	100.4	.296*	560.2	86.2	.196	555.1	87.6	.331**
SAT-M	460.6	83.0	-.058*	402.3	85.6	.082	597.4	91.2	.202	540.2	79.8	.351**

$^{*}p < .05$
$^{**}p < .01$

TABLE 22

Means, Standard Deviations and Correlation Coefficients Between Predictor Variables and FGPA for 1968 Special Action, Negro and Mexican-American EOP Students

	Special Action (N = 29)			Negro (N = 38)			Mexican-American (N = 30)		
	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r
UCLA									
HSGPA	2.96	.33	.026	3.21	.34	.044	3.30	.42	.583**
SAT-V	480.0	80.7	.218	469.2	72.2	.280	486.6	98.0	.174
SAT-M	468.4	95.5	.052	476.4	99.6	.337*	482.0	89.8	.080
UCSB		(N = 64)			(N = 57)			(N = 34)	
HSGPA	2.59	.44	.150	2.76	.49	.176	2.97	.55	.209
SAT-V	408.8	78.2	-.135	415.0	80.3	.135	451.0	94.8	.000
SAT-M	422.4	85.5	-.228	430.3	83.6	-.068	475.1	101.1	-.314

$^{*}p < .05$
$^{**}p < .01$

TABLE 23

Means, Standard Deviations and Correlation Coefficients Between Predictor Variables and FGPA for 1969 Special-Action, Negro and Mexican-American EOP Students

Predictor Variables	Special Action			Negro			Mexican-American		
	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r	$\bar{X}$	S.D.	r
UCLA		(N=35)			(N=30)			(N=42)	
HSGPA	2.91	.30	-.035	3.15	.32	.150	3.18	.41	.460**
SAT-V	429.7	78.9	.277*	439.6	74.1	.225	427.1	80.1	.267*
SAT-M	437.4	90.3	.171	483.0	86.2	.393*	459.2	87.4	.341*
UCSB		(N=61)			(N=42)			(N=54)	
HSGPA	2.62	.33	.122	2.74	.46	.309*	3.07	.46	.371*
SAT-V	389.5	72.9	.206	415.2	93.1	.151	432.6	91.9	.378*
SAT-M	398.3	86.4	-.186	408.1	90.0	-.112	435.0	81.7	-.002

*$p < .05$
**$p < .01$

APPENDIX D

SUPPLEMENTARY TABLES OF REGRESSION EQUATION COMPARISONS

TABLE 24

Summary of Comparison of 1968 vs 1969
UCLA Regression Equations

UCLA[a]	UCLA[b]	SS_H[c]	SS_2[d]	df	F ratio
EOP	EOP	-23423	-40646	90,3	18.248**
L&S	L&S	44300	-125910	188,3	-22.635**
EOP SA	EOP SA	-1273	-11908	17,3	0.784†
EOP N	EOP N	57097	-28143	22,3	-0.182†
EOP MA	EOP MA	67041	-32128	42,3	-1.023†
EOP M	EOP M	-19063	-22401	31,3	10.212**
EOP F	EOP F	-3066	-41982	50,3	1.339†

Note.-Abbreviated: SA = Special Action; N = Negro; MA = Mexican-American; M = Male, F = Female.

[a] 1968 group data

[b] 1969 group data

[c] Residual sum of squares due to variation of individual group (beta) weights about the pooled within class weights.

[d] Residual sum of squares for variation about the regression line in each group.

†p = not significant

**$p < .01$

TABLE 25

Summary of Comparison of 1968 vs 1969
UCSB Regression Equations

UCSB[a]	UCLA[b]	SS_H^d	SS_2^d	df	F ratio
EOP	EOP	50537	93368	92,3	1750.080**
L&S	L&S	-97457	2580	175,2	-2266.252**
EOP SA	EOP SA	-14632	14576	53,3	-19.407**
EOP N	EOP N	36106	45496	34,3	10.316**
EOP MA	EOP MA	-21022	15251	21,3	-11.946**
EOP M	EOP M	-12117	27344	36,3	-6.05**
EOP F	EOP F	27396	-57232	41,3	-7.339**

Note.-Abbreviated: SA = Special Action; N = Negro; MA = Mexican-American; M = Male, F = Female

[a] **1968 group data**

[b] **1969 group data**

[c] Residual sum of squares due to variation of individual group (beta) weights about the pooled within class weights.

[d] Residual sum of squares for variation about the regression line in each group.

**p $<$ .01